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EDITORIAL NOTES

Looking Forward

We must confess to some feeling of pride in the present issue of the "JOURNAL," which contains a report complete in every essential detail of the Conference of the British Commercial Gas Association just held in Leeds. And it was a conference well worth reporting to the extent of the space which we have devoted to it—that is to say, the major part of an issue of the "JOURNAL." No organization could have celebrated its "coming of age" in a more fitting manner, for, while giving proofs of the vitality engendered by the years of its "minority," the whole basis of the conference was the use to which this vitality may be best put in the future. The keynote of the proceedings was, not looking back, but looking forward. To be honoured by the presence of H.R.H. The Prince George was a source of the greatest possible gratification to the members, and success in every direction attended the endeavour which was made to reflect in the programme of the proceedings the importance of the occasion.

Major Geoffrey H. Kitson, the Chairman of the City of Leeds Gas Department, who enjoys the distinction of being the youngest President the B.C.G.A. has ever had, has made a name for himself beyond the confines of his own City. It was a pleasure to see his portrait under the heading "Men of the Moment," in last Saturday's Trade and Engineering Supplement to "The Times;" while we feel sure that his many friends will treasure the cartoon which the marked ability and the sympathetic pencil of our artist, Mr. Fred May, have combined to draw for inclusion in this, our Special B.C.G.A. Number. So far as our own Industry is concerned, the services that Major Kitson has already rendered will be long remembered—and in saying this we would express our confidence that they are but the forerunner of many more equally valuable services to come. His Presidential Address sounded the keynote of the whole of the proceedings, in that part where he referred to the industrial load; for this really constituted the subject-matter of the three valuable papers which were subsequently submitted. "Each in his own area must display initiative, vigilance, and energy in the acquisition of new business," said the President; and this new business must largely consist of the industrial load. It is satisfactory to note the President's view that throughout the country the gas undertakings are making a bold bid for the industrial load; but there is much more still to be done, and Mr. A. W. Smith, Col. Carr, and Mr. C. S. Shapley pointed the way. At the time of the introduction of the incandescent mantle, it was hard to visualize the new era for gas lighting that this invention was to open up; in the same way we believe that it is difficult to measure at the present moment the full potentialities of the industrial load to the Gas Industry.

From the moment of the reception right on to the luncheon to the Retiring President and the Leeds Corporation Gas Committee which closed the conference everything went with that quiet smoothness which is the hall-mark of perfect organization—for good organization, like the mythical small boy, is "seen but not heard." To this everyone who had any share in the arrangements must have contributed, and their efforts won warm appreciation by speakers during the meeting. Mr. Shapley, with his staff, had worked like a Trojan to make the conference the success that it was; and the same is true of Sir Francis Goodenough, Mr. J. C. Walker, and the staff of the B.C.G.A. And all have had their reward.

The sphere of usefulness of the Association was clearly portrayed by Sir Francis when submitting the annual report and accounts; and in connection with these remarks, it is to be hoped that the fullest heed will be taken of the warning with which he concluded: "Your most active and dangerous enemy, gentlemen, is not competition without. It is casualness, indifference, apathy, and ignorance within, and sometimes niggardliness in the employment and payment of the staff needed to do service work. I say it in all seriousness on this our twenty-first anniversary, that the time is short for putting your house in order, if it is not in order already, for the battle is joined, and it is going to be a pretty fierce one. Do not think the B.C.G.A. or the National Gas Council or the Institution of Gas Engineers or any other organization can do for you what you ought to do for yourselves. It cannot save you from the storm if you do not make every preparation and every personal and individual effort to be ready for the contest."

Industrial Organization

In a centre of industry, the conference was appropriately enough concerned mainly with the use of gas in industry, and both the papers and the discussions, besides giving the general public an insight into the great possibilities of gas—for on no previous occasion has a better "Press" been accorded a B.C.G.A. conference—are of the greatest utility, from the points of view of technical worth and considerations of policy, to the Gas Industry itself. Apart from the Presidential Address of Major Kitson, three papers were presented, two of which—those by Mr. A. W. Smith and Col. W. M. Carr—deal exclusively with

the industrial load. Birmingham is, of course, renowned for its work in connection with the development of gas in industry, and Stretford is gaining a well-merited reputation for its enterprising industrial sales policy. One did, in fact, expect a good deal from both Mr. Smith and Col. Carr; and the expectation is fully realized.

For the past twenty-three years the Birmingham Gas Department has been steadily building up an industrial load, and that the organization is effective is proved by the fact that the sales of gas to the industries of Birmingham now amount to about 4000 million c.ft. a year. There is, of course, a great deal behind this simple statement. Faith and courage, as well as technical, commercial, and administrative ability, have been needed to bring about this excellent result. And though we are aware of the special circumstance which enables Birmingham to sell such a quantity of gas to industrialists—the circumstance that industrialists are concentrated in the Department's area of supply—the fact remains that competition in such an area is naturally of the keenest. Every fuel interest finds Birmingham an attraction worthy of intense effort to gain business—which makes the success of the Birmingham Gas Department all the more praiseworthy and all the more significant. We say significant because we believe that the underlying policy of the Department—one of intensified service—can be applied by any gas undertaking in the land. "We are," says Mr. Smith, "ready to give as much attention to what may appear to be a small inquiry as we are to a large one. This has reacted to our benefit, as often our thorough attention to the small inquiry has led to our being entrusted with larger inquiries in the same works." This reaction to new possibilities is the first step towards the development of the industrial load; and the reaction should be general throughout the Gas Industry.

Our dominant impression of Mr. Smith's paper is that, where gas has once been installed in a works, its use has gradually but surely expanded in that works. This is perhaps the best indication possible that gaseous fuel supplies the type of heat the industrialist needs for the success of his production and the benefit of his pocket. And the expansion of the industrial sales of gas has been concurrent with increased efficiency of competitive fuels. There are several reasons for this growing popularity of gas in Birmingham. First of all is the ability of the industrial staff, which has been chosen from men who have made or have been prepared to make a special study of the application of gas to all kinds of industrial heating appliances. Then there is a scheme whereby an industrial service engineer visits each works periodically, when an inspection of all industrial gas appliances is made—a service which is greatly appreciated by consumers, which gives an opportunity of replacing any out-of-date apparatus and places the Department in possession of practically all types of industrial appliances in the area of supply, and which affords information regarding any threatened consumption. The worst enemy of gas is unsatisfactory appliances, and the schemes mentioned, coupled with an efficient repair service, ensure as far as possible that where gas is used it is employed to the best advantage.

We are well aware of the competition which the Gas Industry is having to face from imported fuel oil, and on occasion we hear about oil displacing gas. Birmingham has plenty of competition from oil; and Mr. Smith's account of how gas is displacing oil shows there is no need for despondency. Though at present we may not be in a position to meet all competition from oil, there is no doubt whatever that we are in a much stronger position than we were even a couple of years ago. As Mr. Smith points out, this is particularly noticeable in the case of lower temperature operations. Oil, to be completely burned, has to generate a very high flame temperature, and this is a serious drawback where temperatures of less than 1000° C. are required. In these instances wear and tear on metal parts and refractory materials has been particularly heavy, and thus high maintenance charges with a cheap fuel have on numerous occasions led the manufacturer to a reconsideration of gas fuel, which, although it may be higher in price, can be burned satisfactorily at any required temperature, and the application of which is very low in maintenance charges so far as industrial appliances are concerned.

Bottled Gas

In regard to the future, the prospects of gas in industry were never brighter; and it is a business duty of every gas undertaking to study closely the problem of the price at which gas can be sold in competition. There is no excuse for a lukewarm attitude in regard to industrial gas sales. The appliances at the command of the Industry are wider in variety and higher in efficiency, and are in process of continuous improvement; and there is much greater public appreciation of what gas is likely to accomplish in the industrial sphere. Regarding new applications, Mr. Smith referred to compressed gas. Last June Dr. C. M. Walter, in his paper on industrial gas to the Institution of Gas Engineers, stated that the maximum power output of a standard low compression engine when running on town gas was about 78 p.ct. of that obtained with petrol. Further experiments, however, have resulted in an improvement of over 10 p.ct. on that figure; and by increasing the compression ratio it seems likely that there will be little difference in the maximum power output between engines running on town gas and petrol. The Birmingham Gas Department has now obtained the authority of the Home Office to run a vehicle on gas at 3000 lbs. per sq. in.—a most important step in this new means of applying gas. Already four compressing installations have been erected for experimental work in various parts of the country; and we believe that in a short time "bottled gas" will be employed for many purposes other than motor transport. Such purposes include the lighting and heating of country houses and garages, and of private yachts; and bottled gas may prove useful for carrying out tests on industrial appliances on a prospective consumer's premises where gas is not laid on. We mention bottled gas to serve as an illustration of our assertion that the extended use of gas in industry is full of promise. Let us see that this promise is fulfilled.

The First Steps

There is plenty of sound advice on questions of both planning and policy in Col. Carr's paper on the "Development of the Sale of Gas for Industrial Purposes." Like Mr. Smith he properly emphasizes the necessity of an adequately trained staff, the training to include not only the technical, but the commercial aspect of the work. In brief, industrial salesmen must be equipped to talk to the manufacturer with confidence on his own ground. This is no light task these days, for the manufacturer himself has much more technical knowledge at his command than he had even ten years ago; and we are in hearty agreement with Col. Carr in his insistence that the work of gas development must not be left solely to an industrial department. The closest liaison is necessary between all the departments of a gas undertaking. Also, we believe that there should be a close liaison between the undertakings themselves. In last week's "Journal" we referred to the setting-up of central industrial organizations to serve definite districts in the country, and expressed the opinion that this was a step forward. Urging that there should be complete support of these central organizations, we said: "The future development of the industrial business of the Gas Industry depends largely on the pooling of knowledge and on enthusiastic support—practical as well as theoretical. If that support is forthcoming it does not take much imagination to envisage a closer linking of the work in the districts and a very much wider dissemination of the knowledge which is essential to the gas salesman when he goes out to face modern intensive competition backed up by efficient sales and technical organization." The practical idea of this "closer linking" was a central clearing house, because we want to ensure that there is no overlapping of the work in the various districts. Co-operation within the districts and co-operation between the districts themselves are necessary if the greatest benefits are to be derived from the scheme; and we wholeheartedly

support Col. Carr's contention that the problem must be tackled on a national scale.

Stretford has put forward much effort in developing its industrial gas load, and we call attention to Col. Carr's observations on the value of conducting a comprehensive survey of industrial premises. In his own words, "the number of possible applications of gas in directions previously not considered which has resulted from careful survey has been remarkable in recent experience." We call attention, too, to the author's point that, when submitting a proposal for gaseous heating, wherever possible the efficiency should be stated in terms of cost per unit manufactured or treated, including not only fuel, but incidental labour and other costs. The cost of gas per therm has little significance to the average manufacturer; the cost of a process per unit or weight treated is, with him, an everyday consideration. This, we are sure, is the right approach to the industrialist. Also, gas undertakings might in many instances do quite a lot of business if they offered to supply industrial appliances on hire-purchase terms to small manufacturers. Stretford has gained much in this way.

A section of Col. Carr's paper is devoted to a most useful analysis of the problem of fixing rates for gas for industrial purposes. The factors which make it a paying proposition to offer the large-scale manufacturer gas at a very low price are taken into account, and the point is made that if the industrial rate includes costs which are incurred with other classes of consumer it will normally be too high to meet competition from coal or oil. The conclusion to be drawn is that the revision of the methods of charge for industrial purposes throughout the whole Industry is a matter of the greatest urgency. "If the Industry continues to include in its price to the industrial user charges directly incidental to the supply of gas to domestic users, the industrialists will continue to extend the use of crude oil with consequent disadvantage to the nation, and money which should be employed in the utilization of British labour, and the purchase of our national raw product, will, for the greater part, be expended abroad." Analysis of the costs of gas manufacture, with the effect of the added load in mind, will show that gas can safely be offered for large-scale use at a figure which a few years ago would have been considered outside the ambit of practical politics.

The Unremunerative Consumer

One of the major problems confronting the Industry is how to remedy the hardship imposed on the paying consumers by the loss which a gas undertaking suffers as a result of supplying unremunerative consumers. If every undertaking took stock of the number of the latter type of consumer, the result would be astonishing, and would indicate the urgency of arriving at a solution to the question. There is only one method of attacking the problem—to reward the paying consumer in some way, and, by so doing, to induce the unremunerative to join the ranks of the paying consumers. It is a question of scales of charges and intensive salesmanship; and where failure has been registered in the past the cause is almost invariably a lack of inducement in the scale of charges. Little or nothing will be accomplished unless a reduction in price is given after a comparatively small fixed consumption. In Leeds Mr. C. S. Shapley made a thorough survey of every consumer's account; and the "facts revealed an alarming state of affairs." These facts are set out in Mr. Shapley's B.C.G.A. paper on later pages, and they definitely show the need for all undertakings to carry out a survey on the same lines, when, we think, similar "alarming facts" would become manifest. In Leeds, out of a total of 135,995 consumers, 38,052 were taking less than 10,000 c.ft. a year, and no fewer than 8442 less than 5000 c.ft. a year.

From his analysis Mr. Shapley decided when a consumer began to be remunerative; and he then re-organized his scale of charges, wisely bearing in mind that a penny or even sixpence reduction per 1000 c.ft. would never have the effect of increasing the smaller consumptions, and that a large percentage of the small consumptions were from good-class houses. Hence, to reward the remunerative consumer, he launched a boldly-planned scale by which, broadly, the consumer could enjoy a reduction of 1s. 1d. per 1000 c.ft. on the gas consumed after a fixed amount of 5000 c.ft. This is a real inducement, and is of the greatest possible assistance to the salesman. A special scale of charges has been adopted for central heating, the prices varying from 2s. to 1s. 2d. per 1000 c.ft.; and on this basis much business is being gained. Mr. Shapley's policy is a bold one; and we are convinced that it is a wise one worthy of imitation.

Forthcoming Engagements

Oct. 7.—North of England Association.—Autumn Meeting.

Oct. 7.—Institution of Chemical Engineers.—Meeting at Burlington House, Piccadilly. Paper on "Fluid Friction and its relation to Heat Transfer," by Dr. C. M. White.

Oct. 8.—Scottish Junior Gas Association (Western District).—Meeting in Glasgow. Presidential Address of Mr. S. M'Gown.

Oct. 10.—Institution of Gas Engineers.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 11.—Institution of Gas Engineers.—Meetings of Council, 10 a.m.; Board of Examiners, 12.15 p.m.; Gas Education Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 11.—Illuminating Engineering Society.—Opening Meeting, at 15, Savoy Street, 6.30 p.m. Presidential Address of Lt.-Commander Hadyn T. Harrison.

Oct. 11.—National Gas Council.—Meeting of the Central Executive Board at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m.

Oct. 11.—Federation of Gas Employers.—Meeting of the Central Committee, 28, Grosvenor Gardens, S.W. 1, at 12 noon.

Oct. 12.—Institute of Fuel.—Meeting at Burlington House, Piccadilly. Paper on "The Treatment of Tar," by Dr. J. G. King and Dr. M. A. Matthews.

Oct. 13.—Institution of Gas Engineers.—Meetings of Joint Lighting Committee, 11 a.m.; Gas Appliances Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 14.—Society of Chemical Industry.—Meeting of the Chemical Engineering Group, Burlington House, Piccadilly, 8 p.m. Paper by Prof. J. S. S. Brame on "Colloidal or Coal-Oil Fuel."

Oct. 14.—Manchester District Association of Gas Engineers.—Visit to works of Messrs. Clayton, Son, & Co., Ltd., Hunslet, Leeds.

Oct. 18.—Illuminating Engineering Society.—Visit to the Shakespeare Memorial Theatre, Stratford-on-Avon.

Oct. 19.—B.C.G.A.—Meeting of the Executive Committee, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Oct. 20.—Society of British Gas Industries.—Meeting of Council at 56, Victoria Street, S.W. 1, in the afternoon.

Oct. 20.—Institution of Gas Engineers.—Meetings of Refractory Materials Joint Sub-Committee, 11 a.m.; Pipes Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Oct. 22.—Midland Junior Gas Association.—Visit to Messrs. Geo. Wilson Gas Meters, Ltd., Coventry.

Oct. 22.—Scottish Junior Gas Association (Western District).—Visit to Meter Works of Messrs. W. & B. Cowan, Glasgow.

Oct. 27.—Southern Association of Gas Engineers and Managers (Eastern District).—Meeting at 28, Grosvenor Gardens, London, S.W. 1, 2.30 p.m.

Oct. 27.—Midland Association.—Meeting at Imperial Hotel, Birmingham. Paper by Mr. Arthur Roberts.

Oct. 31.—London and Counties Coke Association.—Meetings of Executive Committee, 11 a.m.; Central Committee, 12 noon; Luncheon, 1 p.m.; Annual General Meeting, 2.30 p.m.; Hotel Metropole, Whitehall Rooms, S.W. 1.

Nov. 1-2.—Institution of Gas Engineers.—Autumn research meeting.

Nov. 3.—Society of British Gas Industries.—Autumn General Meeting, Hotel Metropole, London.

PERSONAL

MR. ROBERT GRANT.

Mr. Robert Grant, J.P., retired from the Secretaryship of the Primitiva Gas Company of Buenos Aires, Ltd., and of its Associated Companies, after 31 years' service with the Parent Company. His friends in the Gas Industry will wish him health and happiness in his retirement after his long service, and particularly after the recent strenuous years during which, under the most active and capable Chairmanship of Mr. P. Ashley Cooper, the fortunes of the Company have been almost miraculously re-established.

As a Magistrate, a member of the Middlesex County Council, and a Governor of several secondary schools, Mr. Grant will not be without employment in his retirement.

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Sir DAVID MILNE-WATSON, D.L., has accepted an invitation to become President of the Bribery and Secret Commissions Prevention League, Incorporated, in succession to the late Earl of Inchcape.

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Mr. J. BELL, B.Sc. (Lond.), A.R.C.S., D.I.C., has been appointed to the Gas Light and Coke Company's Gas Research Fellowship, Imperial College of Science and Technology, South Kensington, for one year as from Oct. 1, in succession to Mr. A. E. Haffner, B.Sc., A.R.C.S.

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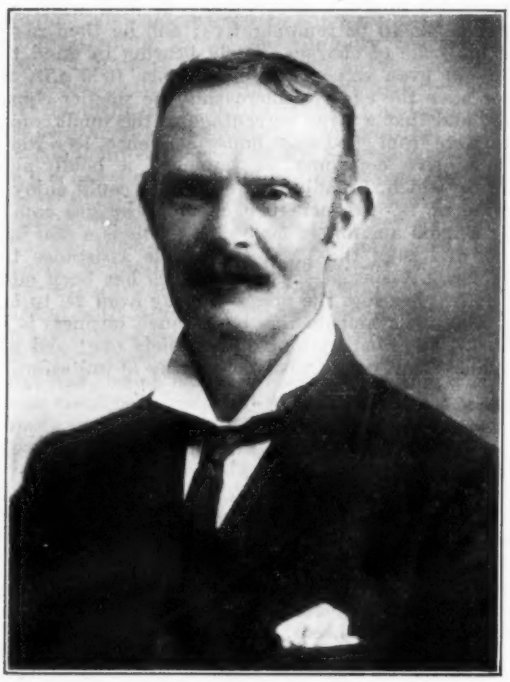
Mr. ALBERT ORMROD, a junior assistant in the office of Mr. F. Greenhalgh, Gas Engineer to the Oldham Corporation, has won a scholarship of £100 a year, tenable at Manchester, for three years. The Gas Committee have requested Mr. Greenhalgh to convey their congratulations to Mr. Ormrod on his success.

OBITUARY

MR. T. O. MORLAND.

In an article which we published in our issue of Aug. 17 last, entitled "Fifty Years' Gas Progress in North Sydney," N.S. Wales, reference was made to the fact that Mr. T. O. Morland, who for nearly fifty years had been associated with the Company as Engineer and



THOMAS OSBORNE MORLAND.

Director, had resigned the latter position in April last. It is with much regret that we have to record that Mr. Morland, who was anxious to pay another visit to his native country, was taken ill on the voyage from Sydney to London, and, having landed on June 27, became gradually worse, and died at Oxton, in Cheshire, on Sept. 12. He was interred in the family vault in Hempsted Churchyard on Sept. 15.

Thomas Osborne Morland was the eldest son of Mr. Robert Morland, who was Engineer to the Gloucester Gas Light Company from 1866 to 1899, when he was succeeded by a younger son, Mr. W. S. Morland, the present Engineer to the Company. The elder son having served an apprenticeship at the works of Messrs. Fielding & Platt, of Gloucester, the famous hydraulic machinery and gas engine makers, was, in 1874, appointed Assistant to his father, who at that time was engaged in building a new works at Hempsted for the Gloucester Gas Light Company; and he remained with the Company till January, 1884, when he left England to take up the position of Engineer to the North Shore Gas Company at North Sydney, N.S. Wales.

Inasmuch as the consumption of gas in this rapidly growing district was increasing at the rate of about 25 to 30 p.ct. per annum, it will be readily understood that the Engineer's position was no sinecure; and in this connection it is interesting to note that the capacity of the works at Neutral Bay, which in 1884 was about 20 million c.ft. per annum, was increased to 2½ million c.ft. per day by 1912.

The site, which was on a rocky slope running down to the Harbour, called for considerable engineering ability and ingenuity in the setting-out of a growing works, but, by cutting away a large amount of rock and by the making of a number of terraces, Mr. Morland took every advantage which the different levels of the site afforded. The rock which was removed from the site was employed in the formation of a substantial sea wharf alongside which vessels of considerable capacity could be discharged. Advantage of the site was also taken in the case of the gasholder tanks, for, instead of the usual excavations, Mr. Morland merely cut away an annular space a few feet wide in the solid rock to act as a seal for the holder, leaving the centre space practically untouched.

Owing to the continued demand for gas, the site at Neutral Bay proved inadequate, and, as a consequence, another works was started in 1912 at Oyster Cove, where a vertical retort plant with a capacity of 2½ million c.ft. per day was erected, this being, at the time, the largest installation of the kind in Australia. In 1929 a waterless gasholder of the M.A.N. type was erected, and was put into commission in 1930—this holder, with a capacity of 2½ million c.ft., being also the largest of its kind in the country.

It is not given to every Gas Engineer to be connected with a Gas Company for 48 years, and during this period to have officiated as Engineer and General Manager, Director, Consulting Engineer, and Chairman of the Board, as was the case with Mr. T. O. Morland, to whose outstanding ability much of the success of the Undertaking was due. One can understand why he became known as the G.O.M. of Gas Engineers in New South Wales.

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MR. E. H. SWAIN.

The death occurred on Sept. 27, of Mr. Edward Henry Swain, M.Inst.Gas E., Assoc.M.Inst.M.E., who had held the position of Chief Engineering Assistant on the Staff of the Gas Referees since April 18, 1921. Though ailing for some time previously, Mr. Swain, who was 61 years of age, continued in regular attendance at the Gas Referees' Office until within a fortnight of his death.

Mr. Swain received his early training in the Offices of the Luton Gas Company under Mr. W. R. Phillips, after which he left to take up the position of Assistant Engineer and Manager to the Oxford and District Gas Company, where he remained for five years. During this period he assisted with the design, erection, and operation of considerable new works plant. He also acted in the capacity of Works Chemist to the Company.

Subsequently he became Gas Engineer and Manager to the Bingley Gas Department, where he served for six years, leaving this position to take up a similar post with the Pontypridd Gas Department. After joining the staff of the Gas Referees, Mr. Swain was, in 1922, appointed Gas Engineer to the Morecambe Corporation, but was induced to retain his position as Engineering Assistant to the Referees.

He was a Past-President of the Wales and Monmouthshire Association of Gas Engineers, and received special acknowledgment from Lord Moulton of his work during the war in connection with the extraction of toluole, &c., at the gasworks of fourteen Welsh towns. He was also a Director of the Llynvi Valley Gas Company.

THE NEWS OF THE WEEK

To Defray the Cost of Street Lighting by gas the Longstone (Derbyshire) Parish Council have decided to organize a whist drive in the parish.

A **Travelling Showroom** has been fitted up by the Tawe Valley Gas Company, and is being used for touring the Company's area of supply.

Three New High-Pressure Gasholders, each measuring 12 ft. 6 in. by 88 ft. 6 in., have recently been completed at the Municipal Gas-Works at Lucerne, Switzerland.

Smokeless Fuel Concessions, Ltd., has been registered with a nominal capital of £5000, states Jordan's register of new companies. Sir Charles E. Hambro is a permanent Director.

"**The Word 'British,'**" said M. Stauning, Prime Minister of Denmark, at the opening of the British Trade Exhibition in Copenhagen, "stands for quality;" and he went on to mention that most of the Danish gas-works had been built by British engineers.

The Bristol Gas Company have considered the question of introducing the system of sending out their bills monthly instead of quarterly, but it is stated there is no immediate prospect of them making such a change. Later on it is probable the matter will receive their further consideration.

A Successful Series of Cookery Lectures and Demonstrations was held last week in the Redditch Gas Company's Showrooms. The lectures were conducted by Miss C. P. Hill, Diplomée C.D.S.Y.T.C.H., who is on the staff of the Company, and who used a Radiation "New World" gas cooker with the "Regulo" controlled oven. A cake baking competition was organized, for which a good number of cakes were entered. The prizes were distributed by Mrs. Chas. R. Hackett.

The British Gas Light Company.

The British Gas Light Company, states the "Financial Times," was established in 1824 and registered in 1857. By virtue of continuity of management, the maintenance of the highest trading traditions and by a steady expansion of interests, the Undertaking rests on strong foundations.

The Company owns gas undertakings at Holywell, Hull, Norwich, Trowbridge, and elsewhere, and controls numerous gas and other utility concerns, including the Bradford-on-Avon, Cromer and King's Lynn Gas Companies, the Swanage Gas and Electricity Company, and the Flint Gas and Water Company. The system comprises altogether 29 gas, one electricity, and one water undertaking.

Since 1923 the ordinary dividend has been maintained at 7½ p.ct., last year's earnings showing a margin equivalent to 2½ p.ct.

Radiation and Room Comfort.

Much attention is being given to-day to the estimation of the parts played by radiation and convection in various heating systems, considered in relation to their influence on bodily warmth and comfort. The results of one line of research in this direction were given last night by Dr. H. M. Vernon in a paper read before the Institution of Heating and Ventilating Engineers.

Dr. Vernon described experiments he had conducted with a globe thermometer in measuring the effectual radiation temperature produced by various heating agents.

At a distance of 6 ft. from a gas fire and an anthracite stove, he said, the effectual radiation temperature was 12° Fahr. and 4·4° Fahr. respectively, and at the same distance from a hot water radiator it was 1·2° Fahr. In rooms warmed by high-temperature overhead heaters it was 4·3° Fahr., while in rooms with ceiling panels heated to 98° Fahr. it was 1·5° Fahr. An under-floor heating system gave a temperature of 1·2° Fahr. Of the heating systems investigated by Dr. Vernon the gas fire approximated most closely to the effectual radiation temperature induced by the sun.

Since it is generally agreed that a certain amount of radiant heating is more pleasant and exhilarating than pure convection heating, these experiments are of considerable use in showing how different heating agents may affect the comfort of those in the room.

Gas at Scottish Ideal Home Exhibition.

The "Daily Mail," whose Scottish Ideal Home Exhibition opens at the Kelvin Hall, Glasgow, to-day (and which continues until Oct. 29) is giving gas the prominence which it deserves and is entitled to.

Mrs. Darcy Braddell, the wife of a London architect, who has designed a series of "Ideal Kitchens" which will be one of the features of the exhibition, has in one kitchen used gas exclusively. Apart from the ideal kitchens, there is another exhibit which will be of interest to members of the Industry. It is a semi-historical exhibit known as "Firesides Thro' The Ages," showing all the fuels, including coke as well as gas. Apart from this, the Gas Industry will be well represented in the exhibition generally. The Gas Department of Glasgow Corporation has an exhibit, while manufacturers will be showing gas appliances.

Capacity and Sensitivity of Purifying Materials

Estimation by Fouling Test.

[CONTRIBUTED.]

The importance of sensitivity in purifying materials is generally recognized, and one finds repeatedly references to "high sensitivity" without any reference to a method by which it may be estimated. The following method gives a relative index which reflects the action of the material under the usual working conditions. The critical conditions have been decided arbitrarily to cover the most commonly used materials.

The fouling is carried out in a prepared hard glass tube, ½ in. in bore and some 18 in. long. Rings are marked on the outside of the tube at the following distances from one end: A, 1½ in.; B, 4½ in.; C, 10½ in.; D, 13½ in. It is convenient but not essential to have the distance between the outermost rings marked off in inches and quarter inches.

About 30 grammes of the air-dried purifying material is broken down to pass a 20 sieve, and thoroughly mixed with sufficient water to give a final moisture content of 30 p.ct., or, in special cases, such other figure as is found to give the best results from the material.

A small pad of cotton wool is inserted and held in position at the 13½-in. mark. The purifying material is filled in with steady, but not violent, tapping on a wooden block or bench, till the level reaches the 1½ in. mark. A plug of cotton wool is placed on the top. The tube is reversed and short (about 1-in.) pieces of moist lead acetate paper are placed on top followed by a plug of cotton wool.

The tube is clamped in a vertical position with the test papers on top, and hydrogen sulphide, washed by a solution of ammonium carbonate and free from air, is passed in at the bottom at such a rate that 1 in. of the purifying material is fouled in five minutes. Immediately the lead papers are blacked the hydrogen sulphide is stopped and the tube removed.

The material lying between the 1½-in. and 4½-in. marks is removed and revivified, as is that between the 10½-in. and 13½-in. marks. These are separately dried at 105° C. and the sulphur is extracted from a suitable portion by extraction with carbon disulphide in a Soxhlet apparatus.

From the percentage of sulphur found (S), the percentage of available ferric oxide is calculated:

$$\text{P.ct. available ferric oxide} = \frac{500\,S}{3\,(100 - S)}.$$

The "sensitivity" of the sample is measured by the ratio of the percentage available ferric oxide in the top section to that of the bottom section, and the "capacity" is measured by the percentage available ferric oxide in the bottom portion.

THE NEWS—continued.

PRINCE GEORGE WATCHING GIRLS AT WORK AT THE FACTORY OF MESSRS. WILSONS & MATHIESONS, LTD., DURING HIS VISIT TO LEEDS ON SEPT. 27.

I.G.E. Transactions Wanted.

The Library of the University of the Witwatersrand, South Africa, was completely destroyed by fire on Christmas Eve, 1931, and the London Library Appeal Committee has asked if a set of the Transactions of the Institution of Gas Engineers could be presented to the University, to help replace the lost Proceedings of the Learned Societies.

Any member having a duplicate set of Transactions and willing to give them to the University is invited to communicate with the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W.1. The volumes would be collected and despatched to South Africa by the Appeal Committee.

The Bryan Donkin Company, Ltd.

Under the heading "Derbyshire Industries," the "Derbyshire Times" dealt, in a recent issue, with the history and activities of the Bryan Donkin Company, Ltd., of Chesterfield, illustrating the article with some interesting views of the works.

The Bryan Donkin Company, Ltd., it is stated, had its beginnings in the days which have been well described as the "heroic age of invention and engineering." Its founder, Bryan Donkin, a Fellow and also a Vice-President of the Royal Society, and Chairman of both the Royal Astronomical Society and the Society of Arts, was born at Sandoe in Northumberland in 1768, when the period known —altogether too vaguely—as the Industrial Revolution had commenced.

The invention and development of the "Fourdrinier" paper machine, which ruined the man from whom it takes its name and subsequently made the fortunes of hundreds by the revolution it effected in the paper industry, played an important part in the creation of the original business of the Bryan Donkin Company.

The business of manufacturing paper-making machines was carried out at works in Bermondsey until about 1893, when the firm commenced to confine their activities largely to the Gas Industry. They had interested themselves in gas engineering as long ago as 1856, when Bryan Donkin, the son of the founder, patented, with B. W. Farey, a rotary engine, consisting of a disc set at an angle to its axis and rotating in a casing which was part of a sphere, one of which was used as a gas exhauster at the Pimlico Works of the London Chartered Gas Company. The principle of this machine is adopted in many of the types of fluid meters at the present day.

The Donkin gas valve, known as the rack and pinion valve, was designed about 1847, and from 1850-1860 these were made in sizes up to 27 in. diameter, the manufacture soon developing into a considerable business, the present output being between 2000 and 3000 tons a year.

Another important section of the business is the manufacture of gas exhausters, which was commenced in 1866.

At the end of 1902 the whole of the works was removed to Chesterfield, after the completion of 100 years in London, and from 1900 to the end of 1905 the Company was continued as Bryan Donkin & Clench, Ltd. At the beginning of 1906 the Company was reformed under the title of "The Bryan Donkin Co., Ltd.," and it has developed considerably during the past 25 years, indeed, the history of these years has been a record of development and achievement in every direction.

They manufacture the Rateau turbo exhauster, in which a very important business has developed since its introduction in this country in 1910 as a result of a license obtained from the late Professor Rateau. Recently three of these machines were sent to Montreal, each being capable of passing one million c.ft. of gas per hour against 15 lbs. pressure, and driven by 1500 h.p. motors.

For the grid scheme of gas distribution the Company have been very successful with their vertical reciprocating compressors, many of which have been supplied to both gas-works and coke oven works for sending gas long distances at high pressure. The Company has made a close study of gas distribution from all angles.

Their other specialities include sulphate and benzole stills, while another interest is the manufacture of the Mahler-Donkin-Bomb calorimeter for testing the heat value of fuels and oils.

The works occupy some 14 acres, 4·3 acres (187,600 sq. yards) being built upon. The machine and erecting shop occupies 66,300 sq. ft., or 1·52 acres, and consists of three bays, each 25 ft. by 396 ft., one 27 ft. by 300 ft., and two each 40 ft. by 300 ft. This is equipped with the most modern machinery and tools.

There are two foundries, occupying 43,150 sq. ft. and equipped with the latest type of labour-saving moulding machines, the largest being capable of lifting and "jolting" a box weighing 14 tons. Between 500 and 600 people are employed by the Company.

Since 1900 the works at Chesterfield have been under the control of the present Managing Director, Alderman Geo. Clark, J.P., M.I.Mech.E., who joined the Company in 1893, and has thus been associated with the firm during the last years at Bermondsey and throughout its history at Chesterfield. Alderman Clark was Chairman of the Council of the Society of British Gas Industries in 1921-2; is a Vice-President of the British Commercial Gas Association, and is on the Grand Council of the Federation of British Industries. In recent years he has been Vice-Chairman of the Company,

BRITISH COMMERCIAL GAS ASSOCIATION

Review of Proceedings

at the TWENTY-FIRST ANNUAL GENERAL MEETING and CONFERENCE, held in Leeds — Sept. 26 to 28, 1932

PRESIDENT - COUNCILLOR GEOFFREY H. KITSON

Fortunate in every respect, the "Coming-of-Age" Conference of the British Commercial Gas Association proved a memorable celebration of a notable event. Though it marked a lengthy life of an active organization, the note was not one of harking back, but of looking forward; attention being focussed mainly on the industrial load, which, zealously taken in hand, offers the brightest of prospects to the Gas Industry. Right through a happy meeting, in hospitality, in organization, and in talent, Leeds proved herself a leader.

[This Review is followed by the Presidential Address, the Papers, the Presentation of the Report and Accounts, and the Speeches at the Dinner.]

The Reception.

The Victoria Hall, in the Town Hall, was well filled on Monday evening for the reception by the Chairman and members of the Leeds Gas Committee. In addition to a full muster of delegates, many prominent citizens were present. Councillor Kitson and Mrs. Kitson, together with Sir Francis Goodenough, Chairman of the Association, supported the Lord Mayor and Lady Mayoress (Alderman F. B. Simpson and Mrs. Simpson) in receiving the guests. During the evening Mr. F. H. Robinson, Engineer and Manager of the Harrogate Gas Company, gave a delightful recital on the great organ. Addressing those present, Councillor Kitson said he had accepted the Presidency of the Association not as an honour to himself and his Committee, but to the City of Leeds. He extended a very hearty welcome to the delegates, and thanked the Lord Mayor and Lady Mayoress for having been with them to receive the guests. He expressed his gratification at having with them that evening many important citizens who were frequently in close touch with matters relating to the Gas Industry. The very foundations of that city, he pointed out, were situated on coal, and apart from the immediate interest which the gas consumers took in the price of gas, or the service which they might get from their own department, the City, together with the nation as a whole, was more interested than it really knew in the future of the Gas Industry.

The Air We Breathe.

There followed an impressive lecture on the subject of atmospheric pollution by Dr. G. C. F. Roe, L.R.C.P. and S. (Ireland), D.P.H., D.P.M., the Halifax Medical Officer of Health, who set out to prove that the effects of smoke and all that it entails are injurious to man, to animal, and to plants; that the continued pollution of the atmosphere in our large cities and towns is a most appallingly costly affair, which we cannot afford; that it is within our powers to prevent such nuisance; and that the sun and the sunshine are the very light of life, and all that is required is a public conscience which will not tolerate for ever and ever the continued fouling of the atmosphere. He said that about one-twelfth of the total death rate in this country is due to respiratory diseases; and in smoky cities and smoky districts the respiratory death rate is almost twice what it is in country districts. Therefore it is only logical to conclude that the smoke pollution and all it entails is responsible for such an appalling and preventible death rate. The infantile mortality rate—which, by the way, is a very sensitive index of the state of public health—in county boroughs for the year 1928 was 74·4. For the same year, in rural districts, it was only 55·5. We inhale practically 35 lbs. of air daily—seven times as much air, by weight, as food and water. Yet we take the greatest precautions in connection with our food and in connection with our water, but we go on polluting and fouling our atmosphere, another illustration of how illogical civilization is. Finally, there is the psychological point of view to be considered. There are colours of nature, of the fields, of the sky; surely they are the very vitamins of the soul, and to destroy these colours is psychologically a crime.

Cost of Smoke Pollution.

As to the appalling cost of smoke pollution, the facts, said Dr. Roe, are quite familiar. Smoke costs this country in the region of £80,000,000 per annum, equal to £2 per head of population. It is estimated that smoke costs the City of London something in the region of £6,000,000 per annum; it costs Birmingham over £2,000,000; it costs Manchester over £2,000,000; and it costs Leeds in the region of £800,000 per annum. It is within our power as a community to prevent the smoke nuisance—by the use of pre-treated coal, by a more extensive use of gas and electricity, and by an expansion of the system whereby classes are held for stokers and boiler attendants. In the last connection, he suggested that employers recognize in a tangible form certificates given at these classes.

The Gospel of Cleanliness.

Proposing a vote of thanks to the lecturer, Dr. J. J. Jervis, D.P.H., the Leeds Medical Officer of Health, remarked that it was a strange thing how long it took a community to realize the truth of a simple gospel. The gospel they had heard that night was the gospel of cleanliness. He paid a tribute to the Gas Industry for what it had done to remedy the appalling state of affairs to which attention had been drawn. The history of the evolution of gas was one of the most entrancing histories that could be found. Gas and other smokeless fuels had brought health to the home, and emancipated woman from a tremendous amount of household drudgery.

A Civic Welcome.

The business assembly on the Tuesday morning was in the Great Hall of Leeds University, and the proceedings

were opened by a civic welcome extended by the Lord Mayor. "In regard to your particular Industry," said Alderman Simpson, "we are proud in Leeds of our various manufactures that are ancillary or related to gas production or service, and we recognize that your Industry is necessarily bound up with their prospects and prosperity also. For that reason we appreciate that on the future of your Industry depend several of our most important industries in this city. We are specially proud of our municipal gas undertaking and enterprise, and particularly of the fact that your President is the Chairman of the Leeds gas undertaking. Our Manager and various employees of the undertaking from time to time have received honour at your hands, and we feel that that is evidence of the recognition by other people of the fact that our gas undertaking is in good keeping. We are certainly satisfied ourselves that our gas undertaking is giving very good service, so far as our local experience is concerned. It is rather interesting, perhaps, to know that Leeds was first lighted by oil, because in 1818 a local chronicler recorded that 'since 1755 Leeds had been partially lit by oil in a fitful maner and by private enterprise.' Therefore, the advent of the coal gas service evidently was an important thing, though when I tell you that the price was 12s. per 1000 c.ft. that offers perhaps a rather interesting comparison with the present price. The citizens of Leeds and people in other parts of the country appreciate the improvement which gas has brought to their homes, and we are all anxious to see its extension still further. I trust that your proceedings will enable you to improve the prospects and prosperity of your Industry."

In acknowledging the welcome, the President said it was evident that the Mayor, as chief citizen of Leeds, was very carefully watching the activities, not only of the gas undertaking in the city, but of the Gas Industry throughout the country. The Lord Mayor last year was closely connected with the Leeds Gas Committee, and it was to be hoped that it would not be long before he was so connected with it again.

The Annual Report and Accounts.

The appointment as Scrutineers of Mr. S. E. Halliwell (Bristol) and Mr. H. E. Copp (Hull) having been agreed to, Sir Francis Goodenough presented the Annual Report and Accounts, which were adopted, after the motion had been seconded by Mr. J. E. Daw, Chairman of the Exeter Gas Light and Coke Company, and last year's President of the Association, and supported by Dr. E. W. Smith, on behalf of the Society of British Gas Industries. Mr. Daw said he had for the past two years been privileged to be on the Executive Committee, and it had been of great interest to see the development of the Association, and the good work it was doing. This portion of the proceedings is reproduced *in extenso* on later pages.

The Real Enemy.

In the course of his remarks, Sir Francis said they had been advised that, in order to protect and forward the interests of the Industry, they should combine and centralize their organizations, but he saw no cause for this. The organizations were well devised for their own jobs, and they were well co-ordinated. "It is," he went on to say, "not increased dependence upon centralized effort that we want, but increased individual effort, increased individual efficiency, increased individual keenness and energy, increased realization of the fact that we are all of us engaged in business, the business of selling gas. . . . I ask you how many gas undertakings, how many gas boards or committees, and how many gas managers put selling and service first? We started as an engineering profession an Industry with a monopoly, and we thought it apparently unnecessary to think about selling. The engineering and scientific phases of our Industry tend in some directions to stand in front of the fundamental principle that if you cannot sell you cannot make. That is what we have to realize in these days of increasing competition which are upon us now and which lie before us in the future. If you will, through adequate, properly trained, and properly paid and properly recognized staff, give your customers good service, not as a condescension and a favour, but willingly as a right and as a duty; if you will through such a staff make the customers glad to deal with you and be friends with you, and if you and your staff feel that every customer is your friend because you are a friend of every customer—then I say you can snap your fingers at competition. But, let me repeat, you can do so only if you put your own house in order and so organize your business throughout that your customers are really your friends, and not people willing and ready and anxious to welcome a competitor, and to get something better in the way of service than what you are giving. Your most active and dangerous enemy, gentlemen, is not competition without. It is casualness, indifference, apathy, and ignorance within and sometimes niggardliness in the employment and payment of the staff needed to do the service work. I say in all seriousness on this our twenty-first anniversary, that the time is short for putting your house in order, if it is not in order already, for the battle is joined, and it is going to be a pretty fierce one. Do not think the B.C.G.A., or the National Gas Council, or the Institution of Gas Engineers, or any other organization can do for you what you ought to do for yourselves. They cannot save you from the storm if you do not make every preparation and every personal and individual effort to be ready for the contest."

Personal.

A letter was read from Mr. W. M. Mason, who was not well enough to be present; and Sir Francis announced that the subscriptions to the testimonial had approached the figure of £350, and Mr. Mason had chosen a small silver salver, which would be presented to him at his home together with a cheque for the balance of the money—something over £300. Sir Francis added that the list was not yet closed, so that those who wished to send any cheques to Mr. Sandeman might still do so. It was agreed that a telegram should be sent to Mr. Mason, and another to Mrs. Cloudesley Brereton, whom, added Sir Francis, they missed that morning for the first time since the conference of the Association started, and whose services to the Industry had been too great easily to be appreciated by those who were not behind the scenes, and had not seen all the work she had done for them during these twenty-one years. The President associated himself with the remarks that had been made about Mr. Mason and Mrs. Cloudesley Brereton.

Mr. Mason's letter was in the following terms:

> MY DEAR SIR FRANCIS,—
>
> It is with very great regret that I am compelled to relinquish the idea of personally attending the Association Conference at Leeds, but my doctor absolutely forbids me to dream of travelling in my state of health. As a matter of fact, I am writting this in bed, where, alas, most of my time is now spent.
>
> As you will understand, I should have been delighted to have been at Leeds—the scene of so many rousing gas meetings—to have personally tried to thank my countless friends in the Industry, not only for their most generous presentation, which I very sincerely appreciate, but even more for the hundreds of kind personal messages received during my illness. I have felt like one looking down on a town at darkening, and watching the lamps lighting all over it. My friends are like these lights in the darkness, and it cheers and comforts one greatly to think that they do not altogether forget. For, after all, in life as in business building, it is the bonds of goodwill and friendship that most strongly hold us.
>
> My thoughts have inevitably been going again and again over the early days of the Association, and the strenuous but happy times that we experienced. The first almost joyous acceptance of the new idea of national co-operation, and then the steady conversion of the others. I smile again as I recall some of my journey reports to you, telling of the cheering conquests and unexpected successes that attended our visits, of the glum faces of Directors and Committee men who reluctantly received what they obviously considered to be a Scotch pickpocket. But how the atmosphere would change when a little Scotch tale would innocently drop into the assembly. Ah, well! at any rate, that membership figure of 96 p.ct. of the Industry was something worth sharing in, if it did take some doing to accomplish.
>
> Alas! the curtain drops on my little part of the programme, but the good work will go on.
>
> My thoughts are with you all, and my warmest good wishes, which I know are reciprocated, go out to my whole circle of friends in the Industry.
>
> Yours very sincerely,
> (Signed) W. M. MASON.

A letter was received from Alderman J. H. Lloyd, of Birmingham, a good friend and Past-President, regretting his inability to attend through indisposition, and another from Mr. W. E. Price, the Hon. Secretary of the Institution of Gas Engineers, explaining that his absence was unhappily due to the death of a near relative, Mr. T. Price, of Walton-on-Thames. The President of the American Gas Association (Mr. R. W. Gallagher) telegraphed: "Best regards to you in your twenty-first conference in Leeds," and it was agreed that a reply telegram should be sent. The President expressed regret at the absence of Alderman Charles Tetley, who had had to go away from Leeds. Alderman Tetley had been Chairman of the Leeds Gas Committee for many years, and had taken the greatest interest in everything done by that body. Councillor Radcliffe, who was still on the Committee, was also unable to be

GAS LIGHTS . . . . *by Fred May*

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COUNCILLOR GEOFFREY H. KITSON

Of Leeds.
President, British Commercial Gas Association, 1931-32.

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with them. He had never yet missed a gas conference in Leeds or any function in connection with the Gas Industry, and particularly asked that apology should be made for his absence.

The New President.

Announcement was then made, amid applause, of the report of the Scrutineers to the effect that Mr. William Cash had been unanimously elected President for next year, and that Messrs. Cash, Stone, & Co. had been elected Auditors for the ensuing year.

In the course of his acknowledgment, Mr. Cash said: Although the Association may have reached full manhood, and, as Sir Francis Goodenough has said, is to be congratulated upon the services it has rendered in the past, I think you will be in accord with him in feeling that in the future we have just as much work to accomplish, and just as difficult duties to perform as those which have fallen to the lot of the Association in the past. I should like to express the hope that you will hold your conference in Bournemouth in a year's time, and that as many of you as possible will do us the honour of paying us a visit there. Bournemouth, of course, differs somewhat from Leeds, in the sense, of course, that it is not in an industrial area, but I hope that if you do honour us with your presence there you will get enjoyment and pleasure by your visit. When I was four months old, I came to Leeds to the house of my grandfather, who lived near Headingley, and on that same day I caught the whooping cough. [Laughter.] That was my first association with Leeds, and when I went home again to Croydon my parents were told that it was an excellent thing for a child suffering from the whooping cough to be taken to a gas-works. Therefore, my first visit to the Croydon Gas-Works was made in these circumstances, and as you know that link has been maintained, because I now happen to be Chairman of the Croydon Gas Company.

Major GEOFFREY H. KITSON,

Chairman of the Leeds Corporation Gas Committee

Major Kitson is a member of a well-known Leeds family, which for many years has been closely associated with the business activities and local government of the West Riding metropolis. He is a second cousin of the present Lord Airedale, and his uncle, Mr. F. J. Kitson, was Lord Mayor of the City in 1908. The late Lord Airedale, when Sir James Kitson, M.P., was the last Mayor and the first Lord Mayor of Leeds in the years 1896 and 1897, and this and other records of public work by the family have been inherited to the full by Major Kitson, who, although but lately launched upon the sea of municipal administration, has already given proof that he is imbued with the family tradition. Major Kitson left Charterhouse to take up a commission in the Artillery, and served during the war in France and India. Returning to civil life he found business matters engaging his attention, and quickly became engrossed in the affairs of the Monk Bridge Iron and Steel Company, Ltd., of which he is now a Director. The Council of the Leeds Chamber of Commerce recently welcomed him to its ranks, not only as a member of a family for long connected with its work, but as a representative of the City's virile young business men; and since joining the Council he has become the Chamber's representative on the governing body of the Leeds Technical College. Even more significant has been his introduction to the work of local government, for following his election to the City Council in November, 1930, he was promptly given the Chairmanship of one of the Corporation's most important trading Departments—the Gas Committee. He has thrown himself into the work with characteristic vigour, and on more than one occasion tributes from members of all parties in the Council have been paid to his business acumen in handling the affairs of this big Department. Under his direction steps have been taken by the Department to increase the output of gas, and in furtherance of this object a new scale of charges has been instituted, relating particularly to central heating.

Telegram to the King.

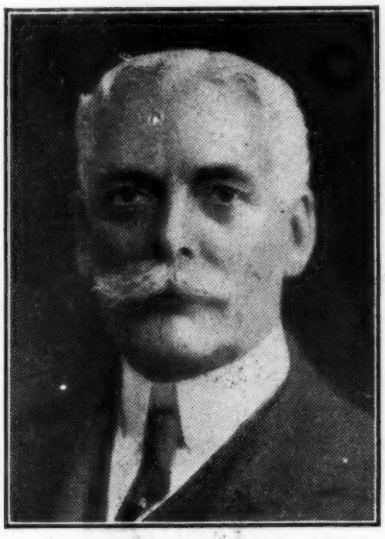
It was announced that the following telegram had been despatched to His Majesty the King, on the occasion of the "Coming-of-Age" Conference:

> The President, Vice-Presidents, and Members of the British Commercial Gas Association assembled at their 21st Annual Conference to discuss how best they can increase their capacity to serve the industries of the country and assist in the revival of trade, tender to His Majesty the King their loyal greetings and wish him good health and happiness for many years. They are honoured and delighted at having with them at their annual dinner this evening His Royal Highness the Prince George.
>
> GEOFFREY KITSON, President.
> FRANCIS GOODENOUGH, Chairman.

How Gas Can Help British Industries.

The Presidential Address formed an appropriate introduction to the main object of the conference, which was

to discuss the many ways in which gas can help British industries. Councillor Kitson pointed out that, for more reasons than one, it was fitting that the Association should celebrate its majority in the City of Leeds. The gas undertakings of Yorkshire, not less than those of the neighbouring county of Lancashire, took a leading part in the founding of the Association, and had loyally backed up its activities and taken part in its deliberations and in its direction ever since. In a sense, they might be said to be making "blue prints" for a new industrial revolution in which the Gas Industry would play an increasing part; and what better place could they have for this than Leeds, whose whole history was a romance of industry? It was a city of a hundred trades, and the heart of the vast industrial population. It was appropriate, too, that they should hold their conference in the great modern University of Leeds, because it was in this University that the Institution of Gas Engineers established the Livesey Chair of Coal, Gas, and Fuel Industries. The Corbet Woodall Scholarship in the University commemorated another great and well-loved leader of the modern Gas Industry, who presided at the Association's first conference. Furthermore, it was the Livesey Professor at Leeds and his colleagues and students who co-operated to much useful purpose with the General Research Committee of the Institution of Gas Engineers, whose work formed an invaluable background to that of the gas salesman. The first conference of the Association was held in Manchester, and most of those who represented the undertakings of the Industry on that occasion went away with a clear idea of the tasks ahead, and a firm resolution to serve the public better by a joint policy of salesmanship through this national organization. It was hoped that this, the twenty-first conference, would be animated by the same spirit; that every delegate would be reminded that the possibilities of development before his undertaking were as great as ever, and that there was new work to do and new service to render.



THE NEW PRESIDENT.
MR. WILLIAM CASH.

Mr. William Cash, J.P., F.C.A., who has been elected President of the British Commercial Gas Association for the coming year, is well known in the Gas Industry and also in the accountancy world. On leaving Haileybury College, he turned to accountancy, and became a partner in the firm of Messrs. Cash, Stone, & Co., in 1889. He has been a member of the Council of the Institute of Chartered Accountants since 1908, and was elected Vice-President in 1920-21 and President in 1921-22 and 1922-23. During the war he carried out important work for various Government Departments, and was one of the Referees appointed under the Munitions Act, 1915. Mr. Cash is at the present time the Chairman of the Bournemouth Gas and Water Company, the Croydon Gas Company, the Barnet District Gas and Water Company, and the South African Lighting Association. He is also a Director of the Brighton, Hove, and Worthing Gas Company, and other commercial undertakings, and is President of the British Waterworks Association. His other activities include the positions of Chairman of the Canterbury Diocesan Board of Finance, and Treasurer of the Archbishop of Canterbury's New Churches Fund. He is also a Justice of the Peace for the County of Surrey.

Consider the value of our Industry in the light of a national fuel policy. Coal was our only native source of energy and heat; and gas and electricity were alternative ways of extracting the potential heat, light, and power from our coalfields. Both gas and electricity had proper spheres of usefulness to the community. Each was destined to immense developments. They would, he hoped, be the driving force of the "back to coal" movement which was essential for the future of so many industries, and, indeed, for the well being of the whole nation. In gas, coal had a powerful ally against the menace of foreign oil.

What the B.C.G.A. Is and Does.

The President remarked that they worked in unison with that powerful influence the National Gas Council, but he thought that the B.C.G.A. could claim credit for first bringing together the administrators and officers of the undertakings for the purpose of development and for making them all think nationally—consumers as well as producers. It was the Association's business to see that the man in the street and the woman in the home got full value for money from their use of gas. The Association was founded in the first place for co-operative publicity, and the word publicity had been interpreted in its widest sense. Though fully alive to the value of other forms of advertising, they were taking large spaces in the National Press because they were still of the opinion that newspaper advertising could make a contact where other agents might fail. Indeed, it would pay them handsomely to increase their already large programme, but this was entirely dependent upon the amount of money they had to spend.

The President gave a brief outline of the services which the Association now renders to the members, because he has more than a suspicion that some are not yet reaping the fullest advantages of membership.

What the Future Has in Store.

Continuing on an optimistic note, the President said that if they planned with foresight, if they seized their chances, there was a great future in store for the Gas Industry. "Let us," he said, "remember that gas production still offers an almost unlimited field to the technician and the inventor. We are only beginning to make the best use of some of the bye-products of the Industry. The domestic field is not yet saturated. It is true that seven million women in this country cook by gas; how many of them are using the latest pattern of gas cooker? How many of them use a refrigerator or a gas water heater, or know indeed of the appliances that now exist? As for gas fires, we shall not be satisfied until every chimney in the land has ceased to belch poisonous smoke into the air. In a true sense we are fighting 'the powers of darkness;' we seek to banish the pall of smoke that broods over all our great cities—and I do not except the city of Leeds. There is no reason in these enlightened days for this persistent burning of raw coal on nearly every hearth in every home. In the homes of the people there are other loads for the Gas Industry."

Every year the advantages to be gained from a steady and lucrative market for coke were more fully realized; they produced the cheapest refrigerator on the market; and the use of gas for central heating was still in its infancy. Throughout the country the gas undertakings were making a bold bid for the industrial load. They were offering industrialists greater heating efficiency in ways no manufacturer could afford to disregard—if the price was right. The President showed himself fully alive to the vital importance of this factor, in advising every gas undertaking with a potential industrial load in its area to institute a scientific analysis of their methods of charge. He emphasized the fact that the Gas Industry of the future can only succeed in proportion to the pains it takes to eradicate its own shortcomings, and not by picking holes in the conduct of others. "Let us not," he went on to say, "forget that the Industry as a whole is often judged of necessity by the performance of individual undertakings. Each of us in his own area must display initiative, vigilance, and energy in the acquisition of new business. Our central organizations can do much. Their record, indeed, is splendid; but ultimately we stand or fall by our own efforts."

Twenty-One Years Ago.

Mr. R. G. Shadbolt, proposing a vote of thanks to the President, said: It is my pleasant privilege, having been the first President of this Association at the time of its formation, to propose to you that we accord the heartiest possible vote of thanks to our President for his address. If you will bear with me for a moment, I should like also to make one or two brief supplementary comments, by the way, in doing so. Twenty-one years ago the Gas Industry, as we remember it then, was very largely an inarticulate

Industry, more particularly so far as the individuals and the communities then served were concerned. You will remember that in those days everything depended upon the technical organizations of the Industry, and the Institution of Gas Engineers struggled in vain, under its circumscribed circumstances of membership and finance, to meet the requirements of the situation. Even our Technical Journals laboured under a heavy handicap. Although not fully realized at the time, there was an unmistakeable, almost instinctive, trend towards adaptation to changing times and conditions, and after nearly a century's quiet, unostentatious service, the Industry awoke to the fact that all was not well with it. From first one quarter and then another came the query, reiterated again and again, " Why cannot we be heard in the land? " " Why should judgment against us always go by default? " and so on.

The first visible moving of the waters came from the commercial sections in the various districts, formed with a view to co-operating more closely in purely commercial matters. Soon the desire for something of a more comprehensive and representative nature made itself felt, and, briefly, the B.C.G.A. was the result. It certainly was not easy going in the initiatory stages, and I well remember that so great was the caution exercised that we—the promoters—had perforce to be content with the scheme put forward being accepted as of a tentative character to begin with, to be discarded if found unsuccessful after two or three years of trial. Later came the Great War, which undoubtedly proved a forceful factor in activating and consolidating all branches of public service. That the lusty child has now reached the age of maturity, and become indispensable to the Industry's progress, is so much a truism, as has been clearly placed before us by the President in his address, that it would be inexcusable of me to dwell upon it. Suffice it to say the Association has much more than justified the expectations of its promoters, and entered upon spheres of useful service not even anticipated by them.

The address is quite typical of the man. Like the Association itself, he is in the heyday of activity and utility. He has proved himself a master in observation and diagnosis, bringing to bear upon the Industry a scientifically trained mind and skilled technical knowledge, dominated withal by the commercial outlook. He is, indeed, a man after our own hearts, and it is of distinct advantage to have such a mind turned critically and constructively on to the work of the Industry and the Association.

The Institution and the Association.

Mr. R. E. Gibson: It gives me very great pleasure to second this vote of thanks to the President for his address. As the B.C.G.A., at its inception, worked under the auspices of the Institution of Gas Engineers, perhaps it is not inappropriate that on the occasion of its twenty-first birthday the privilege of seconding this vote should fall to me, as President for the time being of the Institution. In the address, reference has been made to the part which the Institution of Gas Engineers played in the formation of the Association. Let me say that the Institution is very proud of the fact that it assisted at the birth of so lusty an infant, which grew to vigorous youth, and has now attained its majority. We hope that in the prime of its manhood the Association will be helpful in securing even greater victories for the Gas Industry. Those who were responsible for the formation of the Association twenty-one years ago had great courage and foresight. They realized the need for a publicity organization—a need which has increased with the passing years, and a need which never was so great as it is to-day. Some of those who took part are with us now, including Sir Francis Goodenough, who was a prime mover in the matter twenty-one years ago, and has been a tower of strength to the Association ever since. It is very refreshing to note the cheery optimism of the President.

Publicity Films.

Following the Presidential Address, there was a display of commercial films by Publicity Films, Ltd. Mr. W. J. Sandeman (Croydon), who presided owing to the fact that the President had to leave to meet H.R.H. Prince George, pointed out that the Council of the Association was not responsible in any way for the films, but that they were shown in order to give the members an opportunity of seeing for themselves what was possible in the way of publicity films, and of forming their own opinions on the matter. Before the films were exhibited, Col. A. M. Wilkinson, of the London Press Exchange, gave a short introduction on the general question of film publicity, in which he pointed out the advantages of this form of advertising over all others, in that the position was a " solus " one without any distraction of the attention of the onlooker by adjacent advertisements, as in the case of newspaper advertising. He also stressed the fact that the impression made upon the mind of the onlooker was very much greater, in that attention was concentrated upon the subject matter of the film for (say) 10 minutes, and a much more lasting impression remained than in the case of ordinary advertisements. Commenting on the question of whether the public liked or disliked an advertising film sandwiched in a programme of ordinary entertainment which the public had paid to see, Col. Wilkinson expressed the view that, while objection would undoubtedly be taken to some classes of advertising film, there was little doubt that the public did not object so long as the films were entertaining. At the close of the display, Mr. Sandeman, proposing a vote of thanks to Col. Wilkinson, again emphasized the point that the Executive of the Association had no policy with regard to this matter, but that the question of film publicity was being considered.

Industrial Gas—Achievement and Prospect.

When the conference was resumed on Tuesday afternoon, the first of the three papers was submitted—that by Mr. A. W. Smith, General Manager and Secretary, City of Birmingham Gas Department, who dealt with " Industrial Gas—Achievement and Prospect," and included in his contribution a number of photographs of actual installations, and curves representative of the value of general industrial gas consumptions. Mr. Smith introduced his paper by saying that the fact that Birmingham was a city of twelve hundred trades had no doubt had its influence on the initiation of the policy of the Birmingham Gas Committee in cultivating the industrial heating load. They were very fortunate in Birmingham in having so many diverse trades, so that a depression—except the present one, which was general—never really hit the City as a whole. They had always one trade up when another one was down, and this was giving them much encouragement in the development of their industrial work. They had now received Home Office sanction, in view of the precautions taken, to run a lorry on the road with gas at a pressure of 3000 lbs. per sq. in. He hoped it would be running within a fortnight, and had not the slightest doubt that it would be perfectly successful from the technical point of view. They would, however, have to go carefully into the economics, and charge gas at a price which would really bring the transport companies and the bus companies over to their side, because they naturally had a prejudice in favour of the fuel to which they had been used for so long.

Proceeding, Mr. Smith pointed out the value of the industrial load to gas undertakings was generally recognized. It was necessary, however, occasionally to review the reasons for its importance—what had been accomplished, and what future prospects existed. Some members of the Gas Industry considered the industrial load too fluctuating. This was only so by comparison with the very steady domestic load to which they had been accustomed. The industrial load was less fluctuating than the average industrial enterprise, and was of value to the Industry, the consumer, and the nation (as the most likely medium through which the coal industry might be revitalized.

Birmingham Policy.

The policy of building up an industrial load in Birmingham was initiated 23 years ago, and now the industrial sales are 4000 million c.ft. per annum (27 p.ct. of the total sales). The wide variety of industries served makes for steady consumption, even through depressions. The industrial staff consists of specialists in gas utilization who have also the qualifications of salesmen and can deal with men of all types, including, especially, the workmen who eventually work the gas plant. Unlike furnace makers, the Department makes its profits on the continued use of the furnace —not on its sale. Personal contact with consumers is therefore essential, and results in the staff being consulted before any new heat-using plant is put in.

Showrooms are a necessary adjunct. A standard furnace can be found suitable for most jobs. Where it cannot, a special one can be designed and possibly becomes standard. Besides furnaces the Department supplies all types of auxiliary and control gear provided they can be honestly recommended.

The service scheme for the 5000 odd industrial consumers provides for periodical visits from the Department's staff. Records are kept on a card index, and the scheme leads to many replacements of obsolete plant. By undertaking furnace repairs the Department is able to incorporate improvements. The Gas Industry's worst enemy is the inefficient, extravagant, and unsatisfactory gas appliance. In gaining the goodwill of the customer it is useful to have the services of the Industrial Research Department, which

is equipped to deal with a wide variety of industrial problems.

Results in Birmingham.

Large consumers include one of over 200 million c.ft. per annum, two of 120 millions, and three of over 40 millions. Wolseley Motors, Ltd., have six carburizing furnaces and a battery of re-heating furnaces, both oven and rotary. An interesting Gibbons tunnel kiln is installed for firing insulators at the Midland Electric Manufacturing Company's works. Originally run on producer gas, it now runs on town gas. It deals with 4000-5000 lbs. net weight of insulators in 24 hours. They have also a new conveyor enamel drying plant for the iron cases of switch gear, &c. Two general-purpose low-pressure heat treatment furnaces are installed at Taylor & Challen's works and replace two old type air blast furnaces.

Components, Ltd., of Bournbrook, makers of "Ariel" cycles and motor cycles, recently went over to oil heating for a conveyor enamel drying oven. Fuel costs were apparently less than with gas, but the special tubes in the oil-fired air heater burnt out so frequently and cost so much to replace that it was found to save 4d. an hour by reverting to gas firing. This and other cases have lately led to a considerable increase in the prestige of gas-firing as opposed to oil. Associated Pressings, Ltd., who make hot brass stampings at the rate of 10 tons a week, designed their modern furnace equipment in consultation with the Department, who did extensive experimental work on their behalf. Besides furnaces for heating the stampings, heat treatment furnaces have to be provided for the dies. Hot stamping is to a large extent replacing castings, and, though the Department lost much of their pre-war brass melting load, they have now a billet heating load of far greater size.

British Timken, Ltd., manufacturers of tapered roller bearings, are a good example of a firm using large quantities (nearly 50,000,000 c.ft. per annum) of town gas for the accurate heat treatment of high-class materials. Of special interest is a new furnace with a working chamber 11 ft. by 6 ft. 6 in. by 3 ft. 6 in., which will be used for the heat treatment of roller bearings for rolling mills. These may be as much as 44 in. in diameter. Those of 28 in. diameter weigh about half a ton. The carburizing time of 150 hours is probably the longest ever used and gives a depth of case of $\frac{1}{8}$ in. Throughout the whole time the temperature must be very accurately maintained. Among other furnaces used by this firm are a continuous re-heating circular furnace and a battery of rotary barrel hardening furnaces for carburizing rollers and similar small components. Other noteworthy installations include furnaces for glass bending, forge furnaces used by the Metropolitan-Vickers Electrical Company for turbine blades, and gas-heated plattens for Bakelite mouldings. A comparatively modern and increasing use for gas is in crematoria.

Future Prospects.

The principal factors on which the extension of the industrial load depend are:

(1) The field available. This is very wide, since practically all processes at present carried out with solid and liquid fuels and with producer gas are open to consideration with town gas at suitable prices. Possibly when the coal industry realizes that it is only through the Gas Industry that they can combat the competition of oil, they will set about reducing the price of coal to gas undertakings.

(2) The attitude of gas undertakings. It is to be hoped that all those undertakings which have, up till now, been lukewarm in their efforts to develop an industrial load will realize its importance before competitors have secured all their business. There is abundant technical information available, so that they can no longer plead lack of it.

(3) Competition. The Gas Industry is no longer in a monopolistic position. Strong competition from solid fuel in modern furnaces, electricity, and, more especially, oil must be met. The position in regard to oil is by far the most serious, though it is better than it was two or three years ago. To get good combustion with oil, a very high flame-temperature is necessary, and this leads to heavy maintenance charges for refractories and metal parts. The flame temperature with gas need not be so high, and maintenance charges for low-temperature work are consequently much lower. In high-temperature operations, such as forging, however, fuel costs alone are the deciding factor.

Since oil is being sold in this country at uneconomic prices, the Gas Industry should expect some Government assistance in order that the coal industry may be protected from the competition of imported oil. It is to be hoped that the legislation at present under consideration will enable gas to be sold to industrial consumers at much more elastic rates. From experience in Birmingham, they are satisfied that with gas at 4d. a therm they should be in a position to compete with solid and liquid fuels on an "all-in" cost basis for the *majority* of heat processes requiring varying degrees of refinement similar to those to be met with in their own area of supply.

Bottled Gas.

As is well known, the possible use of bottled gas as a substitute for petrol in road vehicles is being investigated. Recent experiments point to the likelihood of higher compression ratios and better mixing devices making it possible to obtain about the same maximum power with gas as with petrol. The Home Office have now given permission for an experimental vehicle to be run with the new light-weight bottles. Use is likely to be made of bottled gas for supplying country houses, yachts, fêtes, garden parties, and even picnics. Four compressing stations are already being erected in various parts of the country.

Gas in Place of Petrol.

The discussion on Mr. Smith's paper was opened by Mr. E. Crowther (Bradford), who referred to the proposal to use compressed gas in place of petrol. He said that, while no doubt a steady load such as that of a fleet of omnibuses operating from a central depôt would provide a large amount of business, it would be small in comparison with the possibilities of an attempt to replace petrol wherever now used for traction purposes. It would, however, be a matter of great difficulty to provide a sufficient number of compressing stations, with adequate receiver capacity to serve the latter field; and he asked whether it is possible that a solution of the difficulty is to be found in providing (instead of gas cylinders built into the vehicles) small and readily detachable cylinders, so that a full one could be substituted for an empty one in a few moments. The next speaker pointed out that the Sheffield Gas Company, like Birmingham, has for a good many years been alive to the possibilities of the industrial load, and has of late placed at the service of manufacturers one of the most up-to-date laboratories in the country. Within recent years the Company has been fortunate in capturing a large amount of business, by displacing solid fuel fired furnaces. Mr. J. H. Clegg (Burnley) agreed with Mr. Smith as to the advisability of providing new apparatus, rather than undertaking the conversion of existing plant; but he remarked that this is not always possible, on the score of expense. He himself has successfully applied gas to the melting of glass, by converting existing coal-fired lehrs, and he has done the same with the steam-tube type of baker's oven. Mr. Clegg has also pushed considerably steam raising by gas; and in this connection he gave the sound advice to gas engineers that "what they wish to sell they should themselves have faith in and use to the fullest extent." He also entered a plea for the further development of the gas engine. A vote of thanks to Mr. Smith was proposed by Mr. Frank Jones, who referred to the use of compressed gas for motors in France. He, however, urged the smaller undertakings to leave this question of gas for transport purposes in the hands in which it is to-day—for example, the Gas Light and Coke Company, the Tottenham Company, and the Birmingham Corporation. The seconder of the vote was Mr. T. P. Ridley (Newcastle). In reply, Mr. Smith appealed to his audience to have patience a little longer in the matter of compressed gas.

Developing Sales.

The national importance of a cheap and abundant supply of gas for industry—particularly in Great Britain, where coal is the principal natural mineral wealth—constituted the reason for the second paper presented on Tuesday afternoon—as it did also for the first. This second paper was presented by Col. W. M. Carr, T.D., Engineer, General Manager, and Clerk of the Stretford and District Gas Board, and it dealt with "The Development of the Sale of Gas for Industrial Purposes."

Cheap Industrial Fuel Essential.

The Gas Industry has, said Col. Carr, an important part to play in bringing about a revival in the basic industries, by making available a supply of heat derived from coal, readily usable and controllable. The use of raw coal is unscientific and uneconomic. The modern manufacturer is looking for a fuel that can be accurately and scientifically controlled. The Gas Industry should supply this need. The development of the use of gas in industry has been retarded: (*a*) By its large domestic load, which causes

people to think it a domestic fuel only; (*b*) legislative restrictions.

Organization Within the Gas Undertaking.

The staff must be scientifically trained, not only in the use of gas, but in modern factory practice. Training should include a course in fuel technology, general engineering, and gas supply; practical factory experience; the making of industrial surveys in works, and recording the efficiencies of the various fuels used; and a knowledge of accounts and costing. The object of the training is to equip the gas salesman to enable him to talk to the manufacturer on his own ground. The work of gas development cannot be left solely to an Industrial Department. There should be close liaison with the undertaking's chemical staff, engineering staff, mains staff, and general management. A demonstration showroom may prove of assistance to larger undertakings.

Conduct of an Industrial Department Survey and Investigation.

A survey to ascertain the potentialities of the district should include: (*a*) Description of the class of work carried out; (*b*) processes of manufacture in operation; (*c*) description of all plant using fuel; (*d*) class of manufactured article resulting from various heating processes; and (*e*) methods of handling and the general labour employed. Following the survey, there should be an investigation into the possible applications of gas.

It is desirable, when submitting a proposal for gaseous heating, that, wherever possible, the efficiency should be stated in terms of cost per unit manufactured or treated, including not only fuel, but incidental labour and other costs. The cost of gas per therm has little significance to the average manufacturer; the cost of a process per unit or weight treated is, with him, an every-day consideration.

Anticipated efficiencies should be under-stated rather than over-stated in order to allow for the normal variation in working conditions, and for the human element. In respect of the latter, the importance of simplified (and, as far as possible, automatic) control of furnaces cannot be over-stressed, particularly when dealing with a valuable high-grade, clean fuel such as town gas.

The wasteful and inefficient usage of gas in industrial processes has more than anything else prevented the expansion of its use in many factories.

The undertaking should, where possible, supervise an installation and carry out tests of furnaces under working conditions. Cross-referenced records should be preserved.

The manufacturer acquires confidence where the undertaking is prepared not only to supply his industrial appliances, but to guarantee their performance and maintenance. Hire-purchase terms will secure business in cases where small manufacturers cannot lay down the initial capital in one payment.

Charges for Industrial Gas.

It is of the utmost importance that gas for industrial purposes should be sold at an economic rate. Many gas companies, operating under a statutory sliding-scale for the regulation of dividends, are thereby precluded from the setting up of special rates. Municipal undertakings, however, can enter into special contracts.

The following factors of average cost are common to all charges: (1) Net cost of coal (coal less receipts from residuals). (2) Purification. (3) Repairs of plant. It is obviously wrong to base charges for industrial supplies on the average cost of supplying the domestic load.

A two-part tariff for industrial gas at Stretford was worked out from an analysis of the previous year's accounts which was made on a four-part basis: (1) Standing charges consequent on the manufacturing or production plant (interest, sinking fund, taxes, insurance, fixed management salaries). (2) Standing charges consequent on distribution (interest and sinking fund on mains, taxes, insurance, fixed salaries on distribution). (3) All expenses which vary directly with the number of consumers (meter reading, accounts, repairs to meters, cookers, and service pipes, interest and sinking fund on meters, &c.). (4) Actual cost of the manufacture of gas.

Col. Carr then gave a description in detail of the demand charge and the commodity charge in use at Stretford. If gas is to be supplied to meet large fluctuating demands, it is necessary that storage should be installed at the point of user, thus enabling the undertaking to pass on to the consumer the saving in storage cost, and the lower distribution cost. The revision of the methods of industrial charges is very urgent, and unless radical changes are made British money will continue to be expended on foreign oil.

National Organization.

A national organization should be set up under the ægis of the existing Technical Research Organization of the Institution of Gas Engineers. The technical staff of the Industrial Utilization Branch would consist of skilled fuel technologists, metallurgists, and experts in factory practice and industrial heating.

The work of this national organization would comprise: (*a*) General investigation and research; (*b*) co-ordination of work done by individual undertakings; and (*c*) recording and presentation of information as to progress and results. District Industrial Centres should be set up, working in conjunction with the laboratories.

An analysis of the cost of gas manufacture per 1000 c.ft. and per therm for the year ended March 31, 1932, at Stretford is included in the paper.

Experience at Brighouse.

That it is no use attempting to sell gas for industrial purposes at a domestic price is the opinion of Mr. C. R. Ingham (Brighouse), who opened the discussion on Col. Carr's paper. In Brighouse, he said, there has been introduced a four-part tariff for gas sold for industrial purposes —"industrial load" being defined as "non-domestic." The average price works out, for a fairly good industrial consumer, at about 4d. per therm, and at this price they are having a definite chance of business which a few years ago they would not even have known about. A special rate for power has also been introduced at Brighouse. A good business is being done in connection with replacing suction gas plants, at 2·4d. per therm.

Gas Charges Committee.

Arising out of his contention that the Gas Industry declares it is supplying the small consumer at a loss, yet the basis for determining this loss varies with each undertaking, Mr. R. Willacy (Stockport) asked: "Would it not be better for us voluntarily to adopt the report of the Gas Charges Committee, and then the Board of Trade would know where we stand when coming to consider our applications for power to modify and vary our charges for gas?"

Qualifications of Salesmen.

Dr. H. A. Fells, Chief of the Fuel Research Department of the Sheffield Gas Company (who pointed out that he has been associated with the Gas Industry for only about twelve months), said that the qualifications suggested as being suitable for an efficient gas salesman for industrial purposes would be those of a super gas salesman. No doubt there are such men, or such men may be trained in time, but it is very doubtful if in anything like adequate numbers. For the many smaller undertakings the men most likely to be suitable are those of proved practical experience in gas fitting as applied to industrial heating processes of as many types as possible. In larger undertakings the industrial department should be similarly constituted, but an industrial research department should be established in addition, staffed by men of suitable scientific attainment. These industrial research departments should be at the service of the smaller undertakings. It is only by using together men of suitable practical experience and men of proved scientific ability that any true and lasting progress is likely to be made in the industrial use of gas. He emphasized the great value that has been found in the demonstration furnace rooms of the Sheffield Gas Company.

Net Cost of Coal as Basis of Charge.

A question was asked by Mr. T. Carmichael (Portsmouth) as to what variation in price the author makes in relation to variation in price of coal, when dealing with gas used for industrial purposes; and Col. Carr replied that he has in his large contracts a clause which provides that the net cost of coal, as shown in the published accounts, shall be the basis of the charge. The net cost of coal has been within 1d. and 1·2d. per therm for the last four years. With 1·1d. per therm as the net cost of coal, if the net cost exceeds 1·2d. the customer pays the difference; if it goes below 1d. p r therm, the customer gets the difference. This, in his opinion, is better than a contract based upon the price of coal which does not take into account the residuals which have such a great bearing upon the resultant net cost.

Discretion the Better Part.

The Analysis of Cost of Manufacture given by Col. Carr at the end of his paper led Mr. William Cash to voice the

need for care " that we do not allow our enthusiasm to run away with our discretion." In this table the cost of manufacture inclusive of all charges is given as 3·31d. per therm; but the calculations in the paper, showing what this does and does not include, made Mr. Cash remark that the figures do strike one at first sight as being a very cut price. The extent to which these things are being done in the interests of the power consumer means that some other consumer must be bearing the costs which are not covered by the price charged him. On the subject of complicated charges, Mr. Cash warned the Gas Industry of the advisability of devising a simple charge which the public could reasonably and quickly understand—based, if desired, on a scientific method which could be worked out in the offices of the undertaking. He feels, and no doubt rightly, that a large number of the public are confused and irritated by the variety of means which the electrical people have of calculating their charges, and that the Gas Industry must avoid as far as possible a complicated system of charging which irritates and is not easily understood by the man in the street.

Charges and Organization.

Mr. T. P. Ridley (Newcastle-on-Tyne) said that his Company have made an analysis of their costs and revenue for various classes of consumers, and the results showed that the prepayment consumers as a class were paying £50,000 too little, and the industrial consumers were paying £50,000 too much. It is impossible to transfer this sum from one to the other right away, but an endeavour must be made gradually to bring them closer together. Multiple-part tariffs have been in operation in Newcastle for two years, and have been found of very great assistance in selling gas for industrial purposes. With regard to charges, these must be economic, not only to the buyer, but also to the seller, and he emphasized the point made by Mr. Cash in this respect. In 1926, Mr. John E. Cowen, in his Presidential Address, said: " At present our industrial salesmanship is largely confined to working from the Gas Industry outwards—knowing what gas can do first, and discovering what has to be done afterwards. We want men to work as much, though not exclusively, in the opposite direction—knowing the industries and their problems well, and then finding in the Gas Industry afterwards the solution of those industries' needs." Newcastle has been organizing on these lines. A staff of officers so technically trained has been got together, and the results are exceedingly satisfactory.

Mr. Ridley cannot understand why the scheme launched by the National Gas Council a couple of years ago for large industrial sales of gas is not being developed. He hopes that the various districts will quickly get their centres appointed, and will so proceed with the National Central Pooling Scheme. What South Wales is doing in this respect was detailed by Mr. H. D. Madden in a paper read at the recent meeting of the Wales and Monmouthshire Gas Association, which was reproduced in last week's issue of the " JOURNAL."

Production of Benzole.

Proposing a vote of thanks to Col. Carr, Sir David Milne-Watson agreed upon the need for caution as to the price which one might be inclined to offer in connection with the supply of gas for industrial purposes, in so far as what may be given away to the industrial consumers has to be got back from somebody else. At the same time, he does think that there is room for a scaling-down of prices for such supplies. Sir David finds it difficult to understand why the Gas Industry as a whole does not take up benzole production more generally. It is a home produced fuel for which there is a splendid field.

The vote was seconded by Mr. H. E. Copp (Hull), who referred to one or two figures in the paper which he found some difficulty in understanding. In response to the vote, Col. Carr said it was perfectly clear that to-day domestic consumers are being supplied, in the majority of cases, to a certain extent at the expense of the industrial consumers. He submitted that his figures were economically correct, because there are certain loads which are actually reducing costs, and not increasing them.

H.R.H. Prince George Proposes " The Gas Industry."

In the evening members and guests to the number of over 400 assembled in the Victoria Hall, at the invitation of the Chairman and members of the Leeds Corporation Gas Committee, for dinner, at which they were honoured by the presence of H.R.H. The Prince George, K.G., G.C.V.O., who proposed the toast of " The Gas Industry." At the principal table were many who hold leading positions in the Industry; and it was a matter of general regret that, owing to indisposition, it was impossible for Alderman Sir Thomas Rowbotham, J.P., who is Chairman of the Stockport Gas Committee, to be among them, though he had been expected to attend. " It is," said Prince George, " because I know how valuable a servant to the community is the Industry which you represent, and which your Association exists to serve, that I have much pleasure in proposing Many Happy Returns of the Day to the Association, and Health and Prosperity to the Gas Industry." He coupled the toast with the name of the Chairman and President, Major Geoffrey Kitson, who, in reply, declared that for a long time to come the Industry would remember that His Royal Highness was with them on the occasion of this anniversary, and that he did honour to the Gas Industry by proposing this toast.

Receipt was announced of the following reply to the message of loyalty sent earlier in the day to His Majesty the King:

> The King has received with much pleasure the message of loyalty and good wishes from the members of the conference of the British Commercial Gas Association, with whom Prince George is to dine this evening. I am commanded to convey to the President, Vice-Presidents, and members the King's sincere thanks, together with His Majesty's best wishes for a successful issue to their deliberations.

Good Record of Gas Stocks.

Proceeding with his response, the President drew attention to the fact that for a long time past, and all through the recent years of depression, gas stock has stood high, and the Industry has justly felt proud of this fact. During the more recent improvement, industrial share values have gone up, and gas shares have moved forward in the same substantial way. " We have," he declared, " evidently come to the stage where the trading community has decided that things are better. But we must certainly assure ourselves that all the restrictions placed upon our Industry have been removed before we lead ourselves to believe that times of prosperity are again upon us."

The Right Hon. L. S. Amery proposed " The City of Leeds," to which the Lord Mayor responded; and the toast of " The Visitors " (submitted by Alderman R. C. Davies, of Leeds) was acknowledged by Sir David Milne-Watson, who said it would be agreed that there never had been a more successful conference in the history of the Association. Leeds was the Mecca of the Gas Industry, because one of the most important branches of work carried on in connection with it was the research work undertaken with such efficiency in the University. The Gas Industry as a whole owed the Leeds University a great debt of gratitude for what it had done in the past and was continuing to do.

A vote of thanks was proposed by Sir Francis Goodenough to Mr. Shapley and his staff, and Mr. Shapley responded.

A report of the dinner speeches appears on a later page.

What Leeds is Doing.

There was a visit on Wednesday morning to the Leeds Gas Department distribution centre and workshops in Bridge Street, where much was seen and admired. Afterwards the system of gas sales work and service which has been organized at Leeds was explained in a paper read by Mr. Shapley, and this enabled the members still better to appreciate all that they had seen. Many had, of course, been there before, on the occasion of the meeting of the Institution of Gas Engineers in Leeds a couple of years ago; but even two visits are hardly sufficient to enable one to master all that there is to be learned there. We found the Bridge Street Centre to be an excellent tonic. If there are places in which the Gas Industry is not alive to its opportunities, Leeds is certainly not one of them.

In addition to the work of the Department, there had been staged a representative display of modern gas appliances; and we saw in operation a process of turning used gas fires into new ones, of shades and hues to gladden the heart of the artist and to add to the hospitable warmth of every home. The used fires must fail to recognize themselves in their new covering; it is a transformation indeed. Then there was a statement in letters and figures of such proportions that " he who ran might read," which told " How the Leeds Corporation Gas Department helps British trade." Every ratepayer should have a chance of seeing this, and should be *made to read* it.

Again, there was a " Past and Present " exhibit, which was an education in itself. Lighting, indoor and outdoor; fires; cookers, water heating—everywhere, what progress there has been, and is. We are surely unduly modest and

unfair to ourselves if we do not unceasingly protest that we are a live Industry, and not a decaying one.

Sales and Service.

It was explained by Mr. Shapley that the fitting, repairs, and maintenance of appliances are handled at the Bridge Street Centre. The practice is to test a sample of every appliance submitted before exhibiting it in a showroom. The first is a laboratory test for efficiency, and if this is satisfactory the appliance is then subjected to scrutiny as to manufacture and the ease of dismantling for any subsequent repairs. Subsequently a watch is kept upon the behaviour of the appliance in practical use. For this purpose the showrooms are utilized, and in a number of cases the houses of members of the staff. At the showrooms as many appliances as possible are connected to a gas supply; and at Bridge Street and the Dewsbury Road showroom (exclusively used for industrial appliances) all appliances are metered, so that prospective consumers may have an opportunity of ascertaining the cost of running before purchasing. The demonstration room at Bridge Street is, in addition to its other purposes, used as a training centre; and it is the practice for all employees whose duties bring them in touch with the consumers to receive instruction in any new appliance, and to have a refreshing course once every three months on all appliances. This also applies to gas inspectors.

Restricted Expansion.

During the morning, the members proceeded once more to the Great Hall, Leeds University, to hear and discuss a paper entitled "Some Views Regarding the Restricted Expansion of the Gas Industry and Counter Methods Adopted," by Mr. C. S. Shapley, Engineer and General Manager of the City of Leeds Gas Department. "The Gas Industry, though old, is happily thriving," said Mr. Shapley, "but its progress is not what it might and should be, because it has laboured for a number of years under very serious restrictions." He summarizes these restrictions as follows:

(1) The Gas Industry continues to operate largely under antiquated legislation—the Gas-Works Clauses Acts of 1847 and 1871. Formed when gas had a monopoly, these Acts are no longer applicable, as gas has now to compete with electricity and oil.
(2) The electrical industry receives Government support through the Electricity Commissioners.
(3) Competition from foreign oil—which should have a tariff.
(4) Petrol—unless it is more highly taxed—will continue to prevent the development of home produced spirit.
(5) Many municipalities owning Gas Departments tend to restrict the activities of their gas undertakings because municipal trading is taboo.
(6) Profits from municipally-owned gas undertakings are often taken to relieve the rates instead of being used for commercial development of the undertakings.
(7) Some municipalities have eliminated gas for street lighting, and substituted electricity, not on the score of efficiency or cost, but because it is a question of fashion or the change-over provides temporary work for the unemployed.
(8) Some municipal authorities ban the opening of district showrooms, especially in main shopping thoroughfares.
(9) The Coal Mines Bill, intended to maintain high minimum prices, increases the cost of coal and consequently the cost of gas production.

These are some of the handicaps that the Gas Industry has had to face, and yet what is its position to-day? "We find," said Mr. Shapley, "that gas stocks stand firm in the Stock Exchange quotations, and the consumption of gas has steadily grown." In 1882 the annual output of gas in Great Britain was 72,583 million c.ft., and the number of consumers 1,972,000. In 1912 the respective figures were 205,087 million c.ft. and 6,774,357 consumers. In 1932, 331,610 million c.ft. and 10,142,447 consumers.

Mr. Shapley attributes this enormous growth, despite handicaps, to administrative efficiency which has lowered production costs; to the attention now paid to the selling side of the Industry; and to the increased service given to gas consumers.

Scale of Charges for Gas in Leeds.

The most important scheme introduced in Leeds for increasing the sales of gas has been the special scales of charges. These charges, which were adopted after an analysis of every gas consumer's account in Leeds, give reductions in the price of gas according to the amount consumed.

The advantages of the scheme are: (1) All consumers are on the same basis of charge. (2) Inducement is offered for further consumption. (3) One meter only is required per premises. (4) Gas used in one premises for any purpose is charged in accordance with the scale, thus avoiding complicated scales of charges and annoyance to a consumer who formerly paid different prices for gas used for different operations.

The consumer who uses up to 16,000 c.ft. of gas per quarter pays 3s. 9d. per 1000 c.ft. for the first 5000 c.ft. and 2s. 8d. per 1000 c.ft. for the rest. The price of gas declines in proportion to the quantity used, so that the consumer of over 2½ million to 5 million c.ft. pays 3s. for the first 100,000 c.ft., and 2s. 4d. for the rest.

A special scale of charges for central heating has been adopted by the Leeds Gas Department in order to increase this load. The consumer of gas not exceeding 100,000 c.ft. per quarter for central heating pays 2s. per 1000 c.ft.; over 100,000 to 500,000 c.ft., 1s. 9d. per 1000 c.ft.; 500,000 to 3 million c.ft., 1s. 6d. per 1000 c.ft.; 3 million to 4 million c.ft., 1s. 5d. per 1000 c.ft.; and 4 million to 20 million c.ft., 1s. 4d. per 1000 c.ft.

Showrooms Necessary.

Before the discussion on Mr. Shapley's paper was opened, the President extended a hearty welcome to M. E. Simor Saint-Just and M. J. Gaumont, who were attending the meeting as representatives of the French Gas Association.

The first speaker was Mr. Ralph Halkett (Sheffield), who thinks it a wrong policy not to go in for showrooms. His Company now have a showroom right in the heart of the city, and the showrooms are responsible for 78 p.ct. of the sales. Five additional showrooms have been opened in the area, and each one is paying its way. Every effort is made to keep the men up-to-date with all appliances by arranging lectures during the winter months. This results in the highest possible efficiency when the appliances are fixed.

Figures that Should Appeal.

Striking figures were quoted by Mr. P. S. Hoyte (Plymouth), who said that, on a recent visit to South Wales, it astounded him to learn that, with the condition of things in the coal industry there, one could find people with so little sense of patriotism that they are buying foreign oil to displace coal in South Wales itself. The President had said that the Gas Industry employs something over 100,000 men, but actually the figure is double this, because taking as a rough average that each miner raises 200 tons of coal a year, and that the amount carbonized is about 18 million tons a year, the Gas Industry is keeping 90,000 miners in permanent employment. In other words, for every 200 tons of coal displaced in this country by oil, one miner is put out of work, and in the present state of the industry that is an appalling state of affairs.

Comparative Figures.

In Harrogate Mr. F. H. Robinson is experiencing intense competition on the part of the Electricity Department in the matter of cookers; and this induced him to prepare a table of comparative costs, so as to show the household budgets in premises of different rateable values. Figures for ordinary supplies were quoted by Dr. E. W. Smith in the discussion on Mr. A. W. Smith's paper, and Mr. Robinson added to these costs on the slot meter system. With a 20,000 c.ft. consumption, the revenue from a slot meter consumer in Harrogate is £3 19s. The annual cost for the same service for electricity, under the slot meter system, would be £12 a year. The Corporation are running cables to small districts 20 miles away where there are only a few scattered farms. The whole thing, said Mr. Robinson, appears to justify the view that local authorities are being urged to get current taken whether it pays or not, and this is going to be the snag the Gas Industry is up against.

Alluding to this snag, Mr. William Cash suggested that it is one which the electricians themselves will be up against, because if people do enough business of that nature, it can only have one final result. The two ends must be made to meet somewhere.

The Coal Position.

Further reference to the coal question was made by Mr. A. W. Smith (Birmingham), who remarked that the Industry is suffering from the fact that it has to pay the same price per ton on a 100,000-ton contract as the man who buys one truck only. If things go on in this way, he can only see a smash up of either the price-fixing scheme or the

coal industry itself. He expressed the hope that there might be some brains in the coal industry that will be able to find a way out of the impasse that apparently the industry is in at the present time. All that the leaders of the coal industry have been able to do hitherto is to make a dead-set against the public utility undertakings. They have admitted quite openly that they are out to get more from the gas and electricity and other public utilities, who, they say, are protected in their business. This, however, is bound to fail in the end.

An Acknowledgment.

Following upon this, Sir Francis Goodenough urged that the Gas Industry to-day could get a better price for its apparatus and fixing work than it got before it adopted progressive methods and selling and publicity. Good local advertising is not an expenditure, it is an investment; and it helps one to get a good commercial price for what one has to sell. Sir Francis voiced the indebtedness of all present to Mr. Shapley and all his staff for the arrangements in connection with the conference. He also told them, as Chairman of the Association, how much they owed to the President, Major Kitson, for the work done by him during the past twelve months. Very few Presidents had ever put in so much time and thought to their work as Major Kitson. He had been an enormous help in carrying through the somewhat difficult changes that had taken place, and they all owed him a very great debt of gratitude.

Central Heating.

In the course of his remarks, Mr. A. W. Smith said he was a little puzzled as to how Mr. Shapley could justify in an industrial city a special charge as low as he has made it for central heating purposes—lower than the charge to a manufacturer taking the same quantity of gas for ordinary power purposes. The central heating load is, he remarked, only a seasonal load, and from the gas engineer's point of view it is not so attractive as an all-the-year-round load from a manufacturer. Mr. Shapley, when replying to the discussion, made reference to this. He stated that an enormous amount of time was spent in considering the question of charges for central heating. The scale finally decided upon, as set forth in the paper, has enabled him to get central heating business which he would never otherwise have obtained.

Votes of Thanks.

A vote of thanks to Mr. Shapley was carried with acclamation. The proposer, Prof. Smithells, said that he had learned Mr. Shapley's characteristics of knowing what he wants, saying what he thinks, and generally getting what he wants—a summary of qualities of which any man might be proud. "But," proceeded Prof. Smithells, "I particularly wish to say how much we in the University who are connected with the research which we so happily undertake with our colleagues in the industry are indebted to Mr. Shapley for the great help he has given us, and the readiness with which he has placed at our disposal the resources of his Department in carrying on our work. I have never ceased to say, as many of you know, almost to tiresomeness, how anxious we are always to bring into the closest possible association with our work those who are connected with the practical side of the Industry."

The President, who seconded the vote, said Mr. Shapley had done the work of organizing this conference in the way which he (the speaker) knew he would do it. If the results had been successful, thanks were entirely due to Mr. Shapley. Replying, Mr. Shapley said that the work his staff and he had done had been a distinct pleasure.

Councillor H. S. Taylor (Bath), proposing a vote of thanks to the Chairman, the Executive Committee, and staff of the B.C.G.A., said the work carried out during the year and in connection with the conference had been done in an excellent manner and had resulted in the conference, in his opinion, being the most successful that he had ever known. Speaking from a Director's point of view, he could say that the lessons that Directors derived from conferences of this character were most valuable, and this was all due to the work carried out by the Chairman, the Executive Committee, and a most excellent staff working under Sir Francis Goodenough and Mr. Walker.

Alderman G. Clark (Chesterfield), seconding, said he was pleased to have this opportunity of doing so, because he was at the first meeting in Manchester when the Association was launched. The Association had been particularly fortunate in having a man like Sir Francis Goodenough to lead it, because the best Committee in the world could not achieve the results desired unless there were efficient executive officers. It was everybody's regret that Mr. Mason and Mrs. Cloudesley Brereton were not present at this conference, but they welcomed Mr. Walker and Sir Francis Goodenough, who, together with their staff, had done such yeoman service for the organization. It had been one of the happiest inspirations in the Gas Industry when the B.C.G.A. had been formed, because it had brought an interest and cohesion from various Committees and bodies and centralization of the publicity work of the Industry which had been of the greatest possible value. Sir Francis Goodenough, by his great personality, had got around him a staff of most loyal and efficient workers, and no praise could be too high for the work they had all been doing.

The vote was enthusiastically carried.

Luncheon to the Retiring President and the Leeds Gas Committee.

The final function of the conference was a luncheon in the Victoria Hall to the retiring President and the members of the Leeds Gas Committee. Mr. William Cash (President-Elect) was in the chair, and proposed "The Retiring President and the Members of the Leeds Gas Committee." He said it had been a great pleasure to him to be associated in some small way with the proceedings in Leeds in connection with the 21st anniversary of the Association. Everybody who had attended the conference must have been impressed by the very high standard which had been set by those who had been responsible for the organization. Moreover, the proceedings had been graced by the presence of His Royal Highness Prince George. A great deal, continued the Chairman, had been said of the Leeds Gas Committee and the work it was doing, so that it was unnecessary for him to go over that ground again; but he wished once more to express the appreciation of the members of the Association to the Committee and to Major Kitson for the way the Association had been entertained in Leeds. Major Kitson had presided over the affairs of the Association during the year, and also over the meetings of the conference, with an ability and charm of manner that had endeared him to everybody. His Presidential Address had been fully worthy of the occasion, because it had brought into a very concise form the real position in various matters which affected the interests of the Gas Industry generally. He himself knew the large amount of time and energy which Major Kitson had devoted to the affairs of the Association.

Major Kitson, responding to the toast, said that in anything he had done in connection with the Association he had really only been acting as spokesman of the Executive Committee, who had done all the work. It had been an enjoyable year, mainly because the staff of the B.C.G.A. in London was second to none, and, under Sir Francis Goodenough and their very able General Secretary, Mr. Walker, had conducted the affairs of the Association with an efficiency which it would be difficult to improve upon. All he could say to the members of the staff was that he knew they always did their best and that their best was very good indeed. The Leeds Corporation had been extremely pleased that the Association had decided to hold its conference this year in Leeds.

GAS SUPPLY IN GUERNSEY

A Special Correspondent Visits the Works of the Guernsey Gas Light Company

Despite the fact that gas lighting in Guernsey dates back over 100 years, it is satisfactory to find, as the result of a recent visit, that, notwithstanding the competition of electricity, gas continues more than to hold its own on the tomato-growing Island.

The first mention of gas in the Guernsey archives was in October, 1829, when an application was received from Thomas Edge, of the Westminster Gas Light Company, for a twenty-one years' concession. The authorities, as represented by the Chief Pleas Court, while giving their permission for the establishment of a gas-making plant in St. Peter Port, left the decision regarding the concession and the lighting of the public streets of the town by gas to a meeting of the parishioners. The latter, however, were not at first attracted by the new illuminant, and the proposal was turned down by a large majority, the existing system of lighting by oil lamps being regarded as quite adequate. Undaunted by the opposition, Mr. Edge went ahead with his scheme, a small works being erected and several shops in the main street lighted by gas for the first time in November, 1830.

The existing Guernsey Gas Light Company dates back to April, 1850, when the business of the old proprietors was taken over, it being immediately decided to establish a more modern installation with a producing capacity of 100,000 c.ft. per day, with one 60,000-c.ft. gasholder. The opposition to gas for the street lighting took a long time to wear down, the last street oil lamp not disappearing until 1869. In 1871 the distributing mains were extended to the parish of St. Martins to the south, and in 1875 to the township of St. Sampsons to the north of St. Peter Port, while during the 1870-80 decade the demand grew so rapidly that further extension of plant became necessary. Eventually the Directors decided on the establishment of an entirely new works at Le Bouet, a little to the north of St. Peter Port, where the Company's activities have, since 1882, been entirely carried on, only an old gasholder remaining of the original plant. Further extensions were necessary in 1926, when, in addition to a new 500,000-c.ft. holder, the capacity of the retort house was enlarged by one-third.

The Company's Managers.

Since the Undertaking has been under the ægis of the present Company, it has had relatively few Managers. The late Mr. John Chadwick was the first occupant of the post, but he was quickly followed by the late Mr. Joseph Morris, who, after eleven years' service, resigned to devote his energies to the development of the Jersey Gas Undertaking, a description of which appeared in the "Journal" for Aug. 10 last. The next Manager was the late Mr. T. C. Crossley, who was in control from 1862 until his death nearly forty years later, he being succeeded by his son, Mr. Thomas Crossley, this gentleman holding the reins until his demise in 1924. His place was taken by Mr. F. H. Arnold, who had occupied the post of Assistant Engineer for many years, and who retired on pension in 1929, after being with the Company for fifty years. The present Engineer to the Company, combining with that post the positions of Manager and Secretary, is Mr. R. G. Luxon, with Mr. T. W. Bennett as Assistant Manager, both of whom have only one object—that of serving the public with a uniform product at a price which compares favourably with that charged in England by any gas undertaking of similar size.

In 1930 the problem of modernizing the works was seriously tackled, and, thanks to the progressive Board of Directors, under the Chairmanship of Mr. W. de P. Crousaz, the Manager was asked to get out a scheme of reconstruction which has since been completely carried out.

First of all tar towers were installed complete with new tar mains and connections, followed by the introduction of mechanical stoking and coal and coke handling plant. This work was carried out by Messrs. Drakes, Ltd., and consists of a coal elevator of the bucket type discharging on to a drag link conveyor for distribution to the continuous overhead hoppers (200 tons capacity). The machine chosen, in order to keep down dust to a minimum, was a Guest-Gibbons, and the coke is discharged on to a de Brouwer conveyor having an inclined end, with trap door, from which the coke can either be delivered to the water gas plant direct or discharged into the cross conveyor to the coke yard. Power is derived from duplicate 40-H.P. "National" gas engines coupled direct to 25-KW. "B.T.H." generators running at only 225 r.p.m., Mr. Luxon being absolutely opposed to high-speed machinery. For similar reasons the exhausters, which were at this time belt driven from countershafting, were replaced by Wallers latest direct driven steam sets with compensating device, and this was followed by the introduction of a retort house governor and the enlargement of the manufacturing mains. With the complete renewal, including main arches, of six beds of retorts, the scheme of reconstruction was completed at a cost of approximately £20,000. The result is an up-to-date works; and we were particularly struck by its cleanliness.

Attention was next paid to the distributing mains which were in most cases quite inadequate in size, and a complete scheme of enlargement has been adopted by the Board. Ten to twelve miles of such renewal has already been carried out, and since the Board decided, on account of the problem of unemployment, to keep on all employees displaced from the retort house when machinery was introduced, these men are being utilized in opening the roads for the renewal and enlargement of mains.

Mr. R. G. LUXON,
Engineer, Manager, and Secretary to the Guernsey Gas Light Company, Ltd.

Uniform pressure and calorific value throughout the day is the Guernsey slogan, and no "boosting" is therefore resorted to.

A three-months' supply of coal is usually kept on hand. The water gas plant, which is of Dempster manufacture, is in duplicate, it being the practice to add about 30 p.ct. blue gas to the coal gas. Although there is no official control of gas in Guernsey, the Company works to, and maintains, a standard of 480 B.Th.U. per c.ft. The three gasholders have a total storage capacity of 1,250,000 c.ft., two of 500,000 c.ft. each being used for coal gas and the smaller 250,000 c.ft. one for water gas.

Steady Progress.

The table on page 66 is interesting as showing the steady increase both in the number of consumers and the sales of gas during the nearly sixty years which have elapsed since 1863.

It was not until 1904 that the Company introduced prepayment meters to Guernsey, the departure, as will be gathered from the above table, proving a signal success, resulting as it did in a marked increase in the number of consumers. Indeed, at the end of last year, the Company had no fewer than 3224 prepayment meters in service, or about 50 p.ct. of the total in use in the area. Despite the

Gas Supply Progress in Guernsey.

Year.	Number of Consumers.	Sales of Gas.
		C.Ft.
1863	1028	16,161,200
1870	1299	24,202,300
1880	1811	40,105,500
1890	2050	59,254,500
1900	2626	86,681,800
1910	4632	110,906,700
1920	5303	113,060,100
1925	5692	148,116,500
1930	6194	173,556,500
1931	6306	176,603,900
1932	6472	183,850,800

original opposition, the Company has held the Guernsey State contract for the public lighting, with the exception of the Harbour and at St. Sampsons, for many years, the 749 lamps installed consuming approximately 9 million c.ft. per year. Practically the whole of the gas produced is used for lighting, heating, and cooking, there being now little or no demand for gas for power purposes in the Island.

The offices of the Company are located in one of the chief shopping thoroughfares of the town, the lower portion of the premises being set out as an attractive showroom for cookers, stoves, and other gas-using apparatus and fittings, while at the rear are workshops where stove re-conditioning and other repair work is undertaken. As in Jersey, the Guernsey Company finds it necessary to train its own fitters and other workmen, and has a five-years' apprenticeship scheme in operation under which the young employees not only receive a certain remuneration, but are given a bonus of £10 on attaining an award of efficiency. On the social side, a feature of the undertaking is an employees' social club and a rifle range.

REVIEWS

VISCOSITY MEASUREMENT—COAL TARS AND PITCHES.*

Reviewed by E. W. Muddiman, B.Sc., F.I.C.

It is just over a year ago since the South Metropolitan Gas Company published in booklet form an account (reviewed in these columns, April 6, 1931) of investigations carried out in their laboratories into some properties of coal tar; and a second volume, just issued, contains the results of further research by Mr. H. Pickard on the measurement of viscosity of coal tars and pitches. The earlier publication dealt with the general relationship between temperature and consistency of tars and various bituminous binders and described two instruments used in the tests, the Metro Trough Viscometer for measuring consistency of tars, and the Metro Plastimeter for obtaining data regarding the consistency of pitch and similar materials.

The second volume under review compares the results obtained with these instruments and with absolute viscometers—*i.e.*, it concerns the relationship between consistency and viscosity. By "consistency" is meant that characteristic of a bituminous material measured in the prescribed manner by technical viscometers; "viscosity" has the normal scientific meaning and is measured in poises. Kinematic viscosity is the quotient of viscosity and density and is expressed in stokes.

The booklet is divided into two parts, the first dealing with the measurement of the viscosity of coal tars, and the second part with that of pitch. In the first section two different instruments were selected to provide absolute viscosity data—(1) a capillary tube type of viscometer and (2) a rotating cylinder viscometer.

The capillary tube viscometer consisted of a vertical capillary joining two cylindrical vessels, the lower one containing the tar under test and connected by rubber tubing to a mercury reservoir. The upper vessel contained water or other suitable liquid which was extruded and weighed as the tar took its place. The fundamental equation of Poisenille connecting viscosity with flow of fluid through a capillary tube was used to obtain the viscosity in poises. In the case of the rotating cylinder viscometer, a cylinder was suspended centrally by a torsion wire of constant length in an outer cylinder which was rotated by means of gearing. The equation connecting viscosity with angular deflection and speed of rotation being known, the viscosity could be calculated. The values obtained by the two instruments were in fairly close agreement.

In the previous publication it was shown that horizontal retort pitch exhibited no anomalous consistency effects in its velocity-load relationship, and it was now proved by the rotating cylinder viscometer that the viscosity of horizontal retort tar is constant with a varying rate of shear, showing that tar behaves as a true fluid.

As regards the relationship between temperature and viscosity, three tars, each conforming to a different B.S. specification, were tested by the capillary viscometer, and from the figures obtained it is apparent that the same general expression deduced previously ($CT^n = a$) may be used for correlating viscosity-temperature relationships as was used for consistency-temperature changes. Samples of the same three tars were also examined on the Metro Trough Viscometer, and from a comparison of the slopes of the logarithmic curves (temperature : viscosity) it was obvious that the characteristic which was being measured on the Trough Viscometer was a simple function of the viscosity of the material tested.

This leads up to a long series of experiments having as its object the correlation of the Technical Tar Viscometers—the B.R.T.A. Viscometer and the Hutchinson "Junior" Tar Tester—with the Trough Viscometer. From a study of the logarithmic curves so obtained, using a number of tars from coke ovens, vertical retorts and water gas plant, and an asphaltic bitumen, it was apparent that the same numerical relationship existed at all temperatures between the times of flow on any two instruments. It was not possible to give an exact correlation factor, but the mean factor for the B.R.T.A.-Trough correlation was 2·01 : 1, the maximum variations being 2·11 : 1 and 1·87 : 1. The mean factor for the Trough-Hutchinson "Junior" correlation was 1·50 : 1, the maximum variations being 1·53 : 1 and 1·45 : 1.

As a result of discrepancies between the data of some of the consistency determinations with the Technical Viscometers, the figures were compared with those obtained by means of an absolute viscometer, the rotating cylinder being used. Various tars, asphaltic bitumens, and Lyle's Golden Syrup were tried. The values for kinematic viscosity for most of the samples were constant with increasing rate of shear, the exceptions being two different asphaltic bitumens and a tar-bitumen mixture, with which the kinematic viscosity increased progressively, showing that these latter substances exhibit pseudo-viscous properties, and therefore no general conversion formulæ can be applied to them. In the case of tars and other true fluids, however, consistency determinations made with the Metro Trough Viscometer may be correlated by a simple factor with kinematic viscosity. Consistency determinations with the Hutchinson "Junior" Tar Tester must be corrected for buoyancy and density before a simple factor for conversion to kinematic viscosity is applicable. With the B.R.T.A. Viscometer, correlation with the kinematic viscosity is possible, but with less accuracy than is the case with the corrected Hutchinson determinations. Approximate conversion factors for the different instruments are tabulated.

The second part of the booklet deals with the measurement of the viscosity of pitch, and a modified twisting cylinder viscometer was used, the pitch cylinder being about 6·8 cms. long and 1·7 cms. diameter. The capillary-tube viscometer (with different capillary tubes) was utilized for measurements between temperatures of 50° C. to 96° C. It was shown that the consistency equation given above holds for pitch as well as for tars over a wide temperature range. Comparison of the results of penetration tests at different temperatures, measured by the Metro Plastimeter (described in the previous publication), with the results obtained from an absolute viscometer showed a linear logarithmic relationship. Also, the slopes of temperature-consistency curves obtained for a sample of pitch with the Trough Viscometer and the Plastimeter were practically identical. Thus these characteristics of a pitch may be ascertained over a wide temperature range by a measurement of the consistency at any two suitable temperatures with the Trough Viscometer. The Plastimeter affords an easy means of establishing this relationship for highly viscous materials at temperatures approximating to atmospheric.

This second dissertation amplifies the results and conclusions drawn in the booklet issued last year, and in addition explores fully the connection between the values of "consistency" as measured by the various instruments and absolute viscosity. The Metro Trough Viscometer might with advantage be incorporated in a future edition of the B.E.S.A. Specification No. 76 as an alternative instrument for consistency measurement.

* "The Measurement of the Viscosity of Coal Tars and Pitches," by H. Pickard. Published by the South Metropolitan Gas Company, 1932.

Presidential Address

Of Major GEOFFREY KITSON,

Chairman of the Leeds Corporation Gas Committee.

After a year of office as your President it is my privilege to address you on the occasion of your Twenty-First Annual Conference. This would be a special anniversary in any case; but a signal honour has been conferred on the Association to-day. His Royal Highness Prince George has consented to take part in our Conference. He will be with us during the day to see some of the practical side of the Industry's work, and will honour you with an address in the Town Hall this evening.

Nothing is more significant in the history of our own times than the vivid and beneficent interest which the Royal Family has shown in industrial affairs.

The main object of this Conference is to discuss the many ways in which gas can help British Industries. I venture to think that His Royal Highness, in honouring our deliberations, has his eyes on the coming trade revival in which the Gas Industry is destined to play a great and ever-growing part.

Yorkshire and the B.C.G.A.

For more reasons than one it is fitting that the Association should celebrate its majority in this City of Leeds.

At the risk of beginning a minor War of the Roses, I should like to remind you that the gas undertakings of Yorkshire, no less than those of the neighbouring county of Lancashire, took a leading part in the founding of this Association, and have loyally backed up its activities and taken part in its deliberations and in its direction ever since.

As the discussions at this Conference will be concerned mainly with the industrial uses of gas, in a sense we may be said to be making " blue prints " for a new Industrial Revolution in which the Gas Industry will play an increasing part. What better *venue* could you have than Leeds? Modern Leeds is a child of the first Industrial Revolution. Its whole history, indeed, is a romance of industry. It is the City of a Hundred Trades. It is the heart of a vast industrial population.

It is appropriate, too, that we should hold our Conference in the great modern University of Leeds, because it was in this University that the Institution of Gas Engineers chose to establish the Livesey Chair of Coal, Gas, and Fuel Industries, as a memorial to Sir George Livesey, one of the great statesmen of the Gas Industry—indeed, one of the nation's industrial statesmen—widely respected and deeply lamented within and without the Industry to which he was so devoted.

The Corbet Woodall Scholarship in this University commemorates another great and well-loved leader of the modern Gas Industry, who presided at the Association's first Conference and watched over its early growth until the day of his death. Furthermore, it is the Livesey Professor at Leeds and his colleagues and students who co-operate to much useful purpose with the General Research Committee of the Institution of Gas Engineers whose work forms an invaluable background to that of the gas salesman.

On behalf of the Association I wish to thank the University Authorities for their hospitality to us to-day. A citizen of Leeds, I am justly proud of this Yorkshire home of learning and rejoice that the Gas Industry is related to it so closely. The modern Universities exist as a means of preparing the youth of the country for the responsibilities of life in an industrial age.

In the course of this Address I hope to show that the Gas Industry has made bold experiments in the training of its recruits which should be of interest to all who have the cause of education at heart.

The Silent Revolution: 1911-1932.

In our generation we have witnessed spectacular developments in the Gas Industry. Let us travel back twenty odd years on the Time Machine, to the founding of this Association. Who in those days would have dared to predict the immense number of industrial uses to which gas would be turned? It is no exaggeration to say that in every industry where heat is needed—in shipyards, in steelworks, in textile factories—men of foresight and courage have turned their attention to the possible application of town gas. It is true of the oldest and the newest industries alike. In the newest, for instance, within the last few years, gas has firmly established its usefulness in the motor-car and aeroplane workshops of the country.

At the other end of the scale there are a myriad homely uses to which gas has been put. No one could have foretold, twenty years ago, such happenings as these:

that buildings and parks would be floodlighted by gas;
that gas would be used for propelling motor-cars;
that clinical gas lamps would be used for the alleviation of disease;
that gas would be used in thousands of homes and restaurants for making ice-cream;
that women would heat their curling-tongs by plugging in to a gas point.

Such things seem trifles now, because we are assured of immense developments in the future; they are significant, for they illustrate the never-ceasing possibilities of the uses of gas. They help us to realize to-day that we are only beginning to explore the possibilities of the new Gas Industry; that there are new fields to conquer, new loads to acquire. When indeed, through national and local publicity in co-operation, the public have learnt to appreciate to the full the advantages which the Gas Industry can give, we shall be better able with their co-operation to increase our benefits to the public health and the private purse.

The Public Services of Gas.

In my capacity as Chairman of a Corporation Gas Department, I feel that I must allude, however briefly, to the important public services the Gas Industry is performing to-day in this country.

Gas was originally used for lighting and to-day lights the vast majority of our important streets. A short time ago the Westminster City Council made a fresh contract by which 55 miles of streets, including Pall Mall, St. James's Street, Regent Street, and much of Piccadilly, will continue to be lighted by gas until 1947. And, to take an example nearer home, the City Council in Bradford have decided that all new roads shall be lighted by gas.

For a long time gas has been widely used for the heating and ventilation of public buildings. But in the last year or so there has been a notable increase in the number of gas-fired central-heating plants installed in such buildings. I may here indulge my civic pride by pointing out that the new municipal buildings of this city are to be centrally-heated by gas-fired boilers. This decision was made after an exhaustive report by an independent heating engineer.

It is in the domestic field, of course, that the manifold services of gas to the community are most widely appreciated. In housing schemes all over the country, with very few exceptions, gas has been called in to solve the fuel problems of the home. The general provision has been for a gas cooker, gas fires, and a gas wash-boiler.

In many cases provision has also been made for lighting, gas water heaters, and gas irons. I will give but one example of many, and that from another large city.

The Birmingham Corporation have erected well over 36,000 houses in the last twelve years. Every one of these houses has been piped for gas. In each of the later houses points for a cooker, a wash-boiler, two or three fires, and a gas iron were provided.

The recent development in the new Gas Industry has made an immense change in the social habits of our people. There are no less than five million slot consumers on the books of the Gas Industry. "The penny in the slot meter," says Mr. Arthur Hayday, "has simply revolutionized life for our women folk."

For the social reformer—and, whatever our party labels may be, we are all social reformers to-day—there are other considerations besides those of cost, comfort, and convenience. Our Industry, in alliance with enlightened town-planners and public health enthusiasts, is waging tireless war against the evils of smoke pollution so that the smoke pall may be lifted from our cities and the town child may have the same chance of health as the child born and bred in the country.

A National Industry.

The Gas Industry is indeed a national industry in the truest sense, as witness these facts:

It represents £180,000,000 of British money.

It uses annually about 18,000,000 tons of British coal.

Over 100,000 British workmen are on its roll, and many thousands more are employed in its ancillary trades.

Consider the value of our industry in the light of a national fuel policy. The vital fact to grasp here is that coal is our only native source of energy and heat. We have no Niagara. We have no oilfields. Why must we delay in making the fullest use of this great asset? Am I to believe that the nation will procrastinate as in dealing with so many other problems, before realizing that this natural source of wealth must be exploited to the full? Gas and electricity are alternative ways of extracting the potential heat, light, and power from that great reservoir of energy—our coalfields.

There is no excuse for hesitation. The will to serve and the ability to execute are waiting for the word to move. Cannot that move be made without any political or unwanted organized interference?

Both gas and electricity have proper spheres of usefulness to the community. Each is destined to immense developments. They will, I hope, be the driving force of the "back to coal" movement which is essential for the future of so many industries, and indeed for the well being of the whole nation.

It is true that the coal industry contemplates the production from coal of liquid fuels which will meet the competition of foreign oils; but I am afraid it will be a long time before home-produced oil can beat the foreign product.

In gas, coal has a powerful ally against the menace of foreign oil. Gas *is* coal, in a more refined, efficient, and flexible form, and even where gas replaces coal, the output of the collieries is maintained and the collier keeps his job.

An Up-to-the-Minute Industry.

I am by occupation an engineer; and since the beginning of my active connection with the Gas Industry I have made it my business to go closely into the technical organization of this modern industry. This is not the place to go into details; I am here concerned, not with manufacture, but with marketing; but I should like to say that I have found a degree of technical efficiency which should put every pessimist to silence and which is a solid foundation on which the salesman can safely build his life's work.

Co-Partnership and Rationalization.

The relations between employers and employees in the Industry are of the happiest nature, and have for a long time been undisturbed by any note of discord. Over 44,000 gas employees have an interest amounting in the aggregate to over £3,000,000 in their undertakings. I hope that number will be largely increased in the future.

But our Industry has a further claim to be called progressive. It was the first industry to organize itself on a national scale with the object of expanding its sales by co-operative publicity and by giving the best possible service to the consumer. "Service" to-day is almost—I wish I could say it is completely—the watchword of the Industry, but I believe it is true to say that twenty years ago it had scarcely been heard of in the Board Room or in the office of the Departmental Manager. It was this Association which put that word "Service" so prominently before you. See to it that this Association insists that it there remains.

We hear much about rationalization nowadays—rationalization of selling as well as of production. Before this word became so popular, the Gas Industry, through the British Commercial Gas Association, had begun to rationalize its methods of selling. It was a process of rationalization which avoided the pitfalls of complicated finance and unwieldy management. It did not sweep out of existence any undertaking in the country—a practice which in so many industries has recently been carried out to a dangerous degree, wiping out the earning power of men and money, where in many cases it could have been retained. No longer is our Industry a monopoly. It has therefore been all the more necessary to apply the commonsense principles of successful commerce by insisting that the selling of gas requires as much thought and skill and diplomacy as the selling of clothes or food or patent medicine, and by introducing the principle of co-operative action and expenditure into publicity and propaganda.

A Comparison: The Gas Industry Abroad.

Many people seem to think that the prosperity and standing of the Gas Industry in this country is altogether exceptional. They make a gross mistake.

Here are the facts for America, a land in which the generation and use of electricity have been brought to an even more economical pitch than is possible in this country; but where also the application of commercial principles to the development of the Gas Industry has reached a high degree of thoroughness, originality, and efficiency.

The greatest consumption of gas per head of the population is in the big cities—New York, Chicago, and San Francisco.

That nation has fifteen million housewives who cook by gas.

Their sales of gas have increased 110 p.ct. in the last ten years, while the capital invested in their Gas Industry exceeds £1000 million.

Between 1920 and 1930 the sales of manufactured gas to industrial consumers in the States showed an increase of 135 p.ct.

A million pounds worth of gas-operated refrigerators were sold in one year in New York alone.

In five years in the United States a consumption of 25,000 million c.ft. of gas for central-heating was recorded.

In other progressive countries there is much the same story.

In Germany a network of 1800 miles of high-pressure gas mains has been installed to link up the huge modern coke ovens in the Ruhr.

In Sweden there is abundant water power, yet an increase of 10 p.ct. per annum for the past four years has been registered in the use of gas in Stockholm where gas coke is the universal fuel for house heating.

Thinking Nationally.

The B.C.G.A. has been copied so widely, in many industries and many countries, that we are in danger of forgetting the originality of its founders.

It is true that co-operation within the Gas Industry is nothing new. For many years the Institution of Gas Engineers has worked successfully to bring about interchange of views on technical matters. (Indeed, the

Institution stood godfather to the infant Association, and it was members of the Institution who, in their capacity as commercial managers, first realized the need of such an organization.)

We work in unison with that powerful influence the National Gas Council.

But I think that the B.C.G.A. can claim the credit for first bringing together the administrators and the officers of our undertakings for co-operative development and for making us all think nationally—consumers as well as producers.

On the one hand, the Association has brought home to the man in the street the common aims of all our members. It has encouraged him to think of his local gas undertaking—the gasholder in the valley, we hope, the fitters who fix his appliances, the very lamps in the street—as part of one vast national industry, united for service; an industry whose only object is the national well-being, because it cannot flourish unless the man in the street flourishes too. It is the Association's business to see that the man in the street and the woman in the home get full value for money from their use of gas.

On the other hand, the Association has brought together all the constituent gas undertakings, and all their directors or committee men and executive officers, an experiment never before tried nationally, but it has been brought about by the B.C.G.A. and its members, and it is not only of great value to the Industry, but also to the general public.

It has provided a common platform for the exchange of views and methods, and for the formulation of a common policy. It has keyed everyone up to concerted effort because they all realize that a dissatisfied consumer in any one area has a bad effect on every other area, too.

It is useless for any undertaking to assume that, even though it be publicly owned, there is no incumbent responsibility to show the local population all that is best and most up-to-date in the Industry. In the last two years I have taken note of the Industry's showrooms in very many towns, large and small; I have seen very many magnificent examples; a credit to the Industry they represent. I have seen also a few I should like to have destroyed. I always think of the showrooms as the main and essential connecting link between the Industry and its ten million consumers, and not as a monument set up to gratify the whim of local enthusiasm.

Newspaper Advertising.

The Association was founded in the first place for co-operative publicity, and the word publicity has been interpreted in its widest sense.

From the beginning we have done a great deal. We have spent all our available money on advertising in the Press; and though we are fully alive to the value of other forms of advertising and have investigated all and employed some, we are taking large spaces in the National Press because we are still of the opinion that newspaper advertising can make a contact where other agents may fail. Indeed, it would pay us handsomely to increase our already large programme, but this is entirely dependent upon the amount of money we have to spend.

It is indeed gratifying to see that several newspapers have begun to feature industrial news as good and important " copy," and the day has arrived when journalists have realized that the public interest is centred in industrial news, and stories of distant tragedy and intrigue can be relegated to the more obscure pages.

B.C.G.A. Service and Local Sales.

Since 1911, the Association, under pressure of continued requests, has multiplied its activities; and to-day it offers its members a highly efficient service for the development of local sales of gas.

Its scheme of consumer and " consumer-possibilities " recording enables the local manager to conduct his selling campaigns with the least possible waste of effort. In addition, for the internal reorganization of the sales side of undertakings, for the planning, erection, arrangement, and equipment of gas showrooms, the Association offers a complete service.

The Sales Literature produced by the Association is attractive, and I believe can be put to far greater use by individual members.

As for the general " educational " propaganda, which is no less important, much can be, and is being, done through the District Conferences and through the highly qualified lecturers on all subjects connected with the use of gas, who are retained by the Association for district work.

I must mention, however briefly, the direct contact of the Association with the selling force of its members. I think we all recognize the value of the Gas Salesmen's Circles arranged in each district. As for the Association's scheme for the Education of Salesmen, it has already proved a tremendous success; and I have no doubt that thousands of consumers throughout the country have already felt—indirectly—the beneficial effect of that scheme. It only awaits the realization of its value (and the consequent action of utilizing that value) by every undertaking to bring about a further development of the sale of gas all over the country.

You will appreciate that this is a very brief outline of the services which the Association now renders to its members. I give it because I have more than a suspicion that some of us are not even yet reaping the fullest advantages of membership. I do hope everyone concerned will study the chart of B.C.G.A. service which accompanies the printed version of this address. It will repay their study.

A Policy of Recruitment: Attracting Brains.

I have mentioned the help which the Association can give in the training of personnel. But we are individually responsible for the quality of that personnel. I am certainly not one of those who decry the characteristics of their own country and lavish their praise on foreign methods. But I think there is one way in which America has moved ahead of us, though we are fast overhauling them. In the United States the best brains have always been attracted to commerce, largely because commerce has made it its job to see that they are attracted. It is our business to-day to see that, when vacancies occur, the selling side of our Industry gets its fair share of the available promising young men.

It has become increasingly necessary that a systematic recruiting policy should be adopted by every progressive industry. If we are to attract the best type of young man to the selling side of the Gas Industry, we must analyze our needs and make ourselves familiar with the available supplies. In this connection the Goodenough Committee's Report on Education for Salesmanship has given to all employers in the country a valuable lead.

The Gas Industry has already an enviable record for discrimination in the selection of recruits, indeed for many years it has encouraged the use of the invaluable training afforded by the commercial and technical colleges. Many of those who now hold high and responsible positions in the Industry have entered the service as boys, without any initial advantages other than pluck, perseverance, and personal ability.

During the recent International Conference on Commercial Education, Sir David Milne-Watson described his Company's policy of filling vacancies on the staff. By this system the selected candidates are given an all-round experience on the business side of the Company. Each pupil spends a short time at one of the manufacturing stations, in the General Manager's office, and in the Welfare Section of the Company.

The old-fashioned prejudice against commerce has gone for good; commerce is honest buying and selling, and to-day the nation knows it is on commerce it mainly depends. The ambitious young men who will be the leaders of the future are knocking at the door of the commercial department. If we are to get the pick of them we must make them realize that the Gas Industry offers a career open to talent, if they are willing to take off their coats and tackle the job with energy. But we ourselves must face up to the fact that we " cannot get a good representative, any more than we can get a good article, unless we are prepared to pay a good price."*

What the Future Has in Store.

If we plan with foresight, if we seize our chances, there is a great future in store for our Industry. Let us remember that gas production still offers an almost un-

* Report on Education for Salesmanship. p. 13.

limited field to the technician and the inventor. We are only beginning to make the best use of some of the by-products of the Industry. The domestic field is not yet saturated. It is true that seven million women in this country cook by gas; how many of them are using the latest pattern of gas cooker? How many of them use a refrigerator or a gas water heater, or know indeed of the appliances that now exist? As for gas fires, we shall not be satisfied until every chimney in the land has ceased to belch poisonous smoke into the air. In a true sense we are fighting "the powers of darkness;" we seek to banish the pall of smoke that broods over all our great cities—and I do not except the city of Leeds. There is no reason in these enlightened days for this persistent burning of raw coal on nearly every hearth in every home. In the homes of the people there are other loads for the Gas Industry.

(1) Every year we realize more fully the advantages to be gained from a steady and lucrative market for coke.

(2) I have mentioned the great scale on which gas-operated refrigerators are sold in America. We produce the cheapest refrigerator on the market; and it is our task to make that refrigerator "the larder of the future." During the recent hot summer days we have enjoyed, I could not but hope that even this country would wake up to the necessity of universal refrigeration as a comfort, an economy, and an essential of true hygiene.

(3) The use of gas for central heating is still in its infancy. The general tendency of architecture to-day is towards large buildings—for blocks of flats, suites of offices and stores. It is for this Industry to co-operate with the architects, who understand full well the problems of ventilation. There has been so much expression by architects lately of the ventilating value of flues, it must follow in modern building they should be as universally included as the window or the door. In large buildings there is a powerful argument for the use of gas as the agent of central heating. A gas-fired plant takes up little space; its maintenance and supervision costs are low; it is clean, safe, and absolutely reliable; and its first costs compare favourably with those of other systems. Here is a load which we must explore to the utmost of our ability.

As for the industrial applications of gas in the future, the subject is being discussed at the present Conference by distinguished specialists. Here I will only mention the chief advantages of gas for industrial processes:

Its reliability and consequent economy in the regulation of heat.

The fact that atmospheric conditions can be regulated to suit any special process.

The fact that with gas longer zoning of heats is more easily and cheaply obtainable.

The unfailing capacity of gas to meet peak loads of demand.

It is for these and other reasons that gas is used to-day in over 3000 trades for an average of seven processes in each trade and that in some areas half the total output of gas is sold for industrial purposes.

The papers to be delivered by Mr. A. W. Smith and Col. Carr will show that the industrial uses of gas are being developed hand over fist. The industrial laboratories of the Gas Industry are constantly finding new ways in which gaseous fuel can be applied to industrial processes with better results than any other fuel.

Throughout the country the gas undertakings are making a bold bid for the industrial load. They are offering the industrialist greater heating efficiency in ways no manufacturer can afford to disregard—if the price is right. I would say to every gas undertaking which has a potential industrial load in its area, institute a scientific analysis of your methods of charge. Many municipal departments could give—some of them are already giving—a lead to the Industry by adopting new methods of charge which not only increase their business and retain some they might very easily lose, but afford convincing proof that the present legal restrictions on the policy of the Gas Industry at large are anomalous and unjust.

The Gas Industry of the future can only succeed in proportion to the pains it takes to eradicate its own shortcomings, and not by picking holes in the conduct of others. Let us not forget that the Industry as a whole is often judged of necessity by the performance of individual undertakings. Each of us in his own area must display initiative, vigilance, and energy in the acquisition of new business. Our central organizations can do much. Their record, indeed, is splendid; but ultimately we stand or fall by our own efforts.

The first Conference of this Association was held in Manchester. Many of those present to-day retain a clear recollection of that momentous meeting. Those who represented the undertakings of the Industry on that occasion went away with a clear idea of the tasks ahead and a firm resolve to serve the public better by a joint policy of salesmanship through this national organization.

It is my hope that this, the twenty-first Conference, will be animated by the same spirit; that every delegate will be reminded that the possibilities of development before his undertaking are as great as ever, and that there is new work to do and new service to render.

Though my connection with the Industry has been short, you have afforded me a wonderful opportunity of acquiring much intimate knowledge by allowing me to serve you as President of your Association. The knowledge I have gained leaves me completely confident that the future of this Association and the great Industry it stands to serve, are assured.

Views of the Armley Works of Wilsons & Mathiesons, Ltd., visited by Prince George on Sept. 27.

The Report and Accounts

[The Annual Report of the General Committee was reproduced on pp. 694-5 of last week's "JOURNAL."]

The presentation of the report and accounts by Sir Francis Goodenough followed the address of welcome by the Lord Mayor.

Sir FRANCIS GOODENOUGH: By the courtesy of the President, I am being given this opportunity of presenting the report and accounts to you, and he has given me in the programme a reasonable amount of time for so doing, because, this being our coming-of-age conference I feel I should like to say a few more words in presenting the report and accounts than I have done on previous occasions. I hope you will bear with me, because it is natural that on such an occasion one should look back as well as look forward; but I can assure you that in looking back we of the Management do so not for the purpose of patting ourselves on the back, but rather for getting some encouragement from the progress that has been made, and, still more, a realization of the progress that remains to be made and the work that remains to be done.

One naturally is inclined to ask "Has the Association up-to-date fulfilled the expectations that were entertained with regard to it twenty-one years ago?" Well, there is one test in that respect that one may refer to, and is referred to in the report, and that is that in the past year, in spite of the national economic depression that we have been passing through, the income of the Association has substantially increased, and that is only in accord with the history of the Association throughout its twenty-one years. We have been steadily supported by an increasing income from the Industry. There is an old saying that "money talks," and one can feel that if the Industry were not reasonably satisfied the income would not have been maintained and increased; but if the Industry has been reasonably satisfied, I want to assure you, as Chairman of the Executive, that as an Executive Committee we are not satisfied. We have done our best, but we feel that better still remains to be done. We are looking forward, not looking back, and I only refer to the financial history of the Association as a reasonable encouragement to us that our work has not been altogether without appreciation. But on that question of income I do want to say that we have not got anything like enough income to do the work that can be done for the Industry at a profit. If we had double the income we have, we could get a four-fold harvest for the Industry. Within reasonable limits, the more you spend upon publicity the higher the return per pound expended is, and so I do ask that all undertakings should subscribe at the fullest rate that a good many do subscribe at already, and that the Industry should seriously think about the question of spending a great deal more upon the defence and the development of the Industry in which we are so much interested.

It is interesting for us to realize, again speaking historically, that we were the first experiment in co-operative publicity and in co-operative commercial development in industry. Other experiments have followed in other industries—the milk trade, the fruit trade, the motor trade, and the electrical industry—and I believe co-operative commercial development has a great future before it, not only in the home market, but in the development of Overseas trade. The Exhibition of British goods at Copenhagen, opened with such promise and success by the Prince of Wales a few days ago, is the latest and, I am sure, it will not be the last, example of co-operative marketing, and I think we may be proud as an industry of the fact that we were the first industry to realize the possibilities of co-operative publicity and co-operative development.

But, as I have said, there is much more to do. We are always getting evidence from our advertising campaigns of the fact that there is more to be done by individual undertakings, as well as by the national organization, for the development of gas. We have just started our autumn campaign for gas fires, and we are getting a tremendous number of inquiries as the result. We are getting, also, as we always do when we launch a campaign, evidence of the fact that some individual undertakings are not as progressive and up-to-date and as efficient in regard to local publicity for educating their consumers or in willingness and capacity to give service to the customer, as they might be.

WHAT IS NEEDED.

The harvest which individual undertakings can reap from the national publicity campaigns depends upon the efficiency of the individual undertakings; and I think we want to realize very fully—and I expect all here do realize very fully—the difficult days that lie before us. The Grid is in process of completion. It is going to be a financial "white elephant," but what is going to be the result of that? There is going to be a desperate effort to get business for the Grid in order to lessen the financial failure of it, and save as far as possible the faces of the politicians; and so we are going to be up against very severe competition, probably more thoroughly backed up from Whitehall than ever before. We must be prepared for that, everyone of us. We have been advised that, in order to protect and forward the interests of the Industry we should combine and centralize our organizations. Well, I see no cause for that. The organizations are well devised for their own jobs, and they are well co-ordinated. It is not increased dependence upon centralized effort that we want but increased individual effort, increased individual efficiency, increased individual keenness and energy, increased realization of the fact that we are all of us engaged in business, the business of selling gas. We are not engaged primarily in engineering. We are not engaged primarily in chemical processes. We are not engaged primarily in finance or accountancy. We are engaged primarily in selling gas in order to give us an opportunity to be engineers, to be chemists, to keep accounts, and to work out costs; to give us the opportunity, in short, to exist—because if we do not maintain the sales of gas we cannot maintain anything. Marketing comes first and foremost. We have got a product, and we must develop the commercial side of our Industry or all the other sides must collapse into ruin. I ask you how many gas undertakings, how many gas boards or committees, and how many gas managers put selling and service first? We started as an engineering profession and industry with a monopoly, and we thought it apparently unnecessary to think about selling. The engineering and scientific phases of our Industry tend in some directions to stand in front of the fundamental principle that if you cannot sell you cannot make. That is what we have to realize in these days of increasing competition which are upon us now and which lie before us in the future. If you will, through adequate, properly trained, properly paid, and properly recognized staff, give your customers good service, not as a condescension and a favour, but willingly as a right and as a duty; if you will through such a staff make the customers glad to deal with you and be friends with you; and if you and your staff feel that every customer is your friend because you are a friend of every customer; then I say you can snap your fingers at competition. But, let me repeat, you can do so only if you put your own house in order and so organize your business throughout that your customers are really your friends and not people willing and ready and anxious to welcome a competitor and to get something better in the way of service than what you are giving them.

Your most active and dangerous enemy, gentlemen, is not competition without. It is casualness, indifference, apathy, and ignorance within, and sometimes niggardliness in the employment and payment of the staff needed to do service work. I say it in all seriousness on this our twenty-first anniversary, that the time is short for putting your house in order, if it is not in order already, for the battle is joined, and it is going to be a pretty fierce one. Do not think the B.C.G.A. or the National Gas Council or the Institution of Gas Engineers or any other organization can do for you what you ought to do for yourselves. It cannot save you from the storm if you do not make every preparation and every personal and individual effort to be ready for the contest.

That, gentleman, is what I wanted to say to you on this anniversary, when we are looking forward and not looking back, because we realize there is a big task before us.

STAFF CHANGES.

Before moving the resolution with regard to the report and accounts may I refer to the paragraph in the report which deals with staff changes. We were very hopeful that we were going to have Mr. Mason with us to-day, but he cannot be here because he is not well enough. [Sir Francis read a letter from Mr. Mason, which appears on another page.] I am sure the members will wish to send Mr. Mason a telegram from this meeting, and I have pleasure in announcing that the subscriptions to the testimonial to Mr. Mason have approached the figure of £350, and he has

chosen a small silver salver, which will be presented to him at his home, together with a cheque for the balance of the money, something over £300. The list is not yet closed, so any of you who have forgotten up to the present to send in cheques to Mr. Sandeman may still do so without being too late. I am sure you will also like to send a telegram to Mrs. Cloudesley Brereton, whom we greatly miss this morning from the first conference since we started, and whose services to the Industry have been too great easily to be appreciated by those who were not behind the scenes and saw all the work she has done for us through these twenty-one years, work for which we are deeply grateful.

With these personal references to those who are not with us I will move: "That the twenty-first Annual Report of the Executive Committee and audited Statement of Accounts for the year ended 31st March, 1932, be approved and adopted."

Mr. J. E. Daw (Exeter): I should like to second the adoption of the Report and Accounts, and I think they are very satisfactory. I have for the past two years been privileged to be on the Executive Committee, and it has been of great interest to see the development of the Association and the good work it is doing. I am sure I echo Sir Francis Goodenough's regret that Mr. Mason—who was always smiling, and when we felt a bit down was always ready to give us a story to cheer us up—is not with us because he is confined to his bed. We also miss Mrs. Cloudesley Brereton; and this is, I believe, the first occasion in the twenty-one years of the Association that she has been absent from our meetings. I am sure she will appreciate, as well as Mr. Mason, a telegram from this meeting to say how much we miss their presence.

Comparative Costs.

Dr. E. W. Smith: On behalf of the Society of British Gas Industries I have very great pleasure in supporting this resolution and in giving the maximum commendation to the work of the Association. Every member of the Society of British Gas Industries will always continue to support a progressive unified policy such as that which is being carried out by the Association. We, with many engineers, feel that it is a good thing to spend the maximum amount of money in the way in which money is being spent to-day by the Association. We also feel that the point Sir Francis Goodenough has made, that it is still more important for individual undertakings to see that they are doing the maximum that can be done in their own localities to support the Industry as a whole, is an extremely sound one. As regards a unified policy I do not think one can understand better the work that is being done in this connection than by a knowledge of what is being done in Harrogate. If I might be allowed to mention it, Mr. Robinson, the Gas Manager there, just recently made a comparison of exceptional interest in showing the relative costs of the use of gas and electricity. These figures are definitely safely comparable, and the comparison covers three different sizes of house or three different types of consumption. In the first case the consumption is about 20,000 c.ft. of gas per annum and the total cost is £3 19s., whereas electricity at ½d. per unit—which the ordinary consumer regards as extraordinarily low—comes out at £7 2s. 1d. In the next comparison gas costs £5 8s. 9d. and electricity £9 17s. 10d., while in the third instance—and I am still speaking of moderate size houses—the cost of gas is £8 0s. 2d. against £13 5s. 7d. for electricity. If that type of information, which is always available from the Association and can be obtained from most undertakings, were made better known, there would not be quite so effective a campaign on the part of electricity. At the same time, although the Grid might be a great danger—and I think it is—I do think that oil is likely to be at least as great a danger, and there needs to be just as much care taken in watching what the politicians and those who are behind the politicians in connection with oil are doing as it is to watch what is being done in connection with electricity. Therefore, I do suggest that a close watch should be kept on any moves in the direction of arrangements as regards oil, and that the less oil that can be used for gas making, as time goes on, the better for our competition with these other forms of fuel.

The President: Before putting that resolution to you I cannot let the opportunity go by of associating myself particularly with the remarks that have been made about Mr. Mason and Mrs. Cloudesley Brereton. These changes in organization are from time to time inevitable. I was not privileged to see, like many of you have done, the work which Mr. Mason has done. To some extent it is rather history to me, but I had the privilege of knowing Mrs. Cloudesley Brereton for a year, and I particularly want to associate myself with what has been said about these two. I now put to you the resolution which has been proposed by Sir Francis Goodenough that the Report and Accounts for the year ended March 31, 1932, be approved and adopted.

The resolution was carried unanimously.

Annual Dinner of the B.C.G.A.

The Annual Dinner was held in the Town Hall, Leeds, on Tuesday, Sept. 27. The President was in the Chair, and the guest of the evening was H.R.H. Prince George, K.G., G.V.C.O.

The Loyal Toasts having been honoured,

H.R.H. Prince George, proposing "The Gas Industry," said: I want, first of all, to thank you for the kind way in which you have received the toasts of my family, and Major Kitson for his kindly reference to myself. Next, I would like to say how much I am enjoying this Coming-of-Age Party, always a rather jolly affair, especially if it is the occasion of coming into a good sound inheritance, and that is how this party might well be described. It is my pleasant duty to propose the health of the parents and child together, for I am going to ask you presently to drink to the prosperity of the Gas Industry, including the Association which has just come of age.

When I was inquiring about the age of the parent Industry, I was interested to find that when this child was born in 1911, the Industry was 99 years old—evidently a very healthy nonogenarian! And then it struck me as a rather significant figure. Many leases are for 99 years, and from what I gather, the formation of the British Commercial Gas Association gave a new lease of life to the Industry which gave birth to it, and has been progressing steadily to better and better health ever since.

I am going to make a little confession to you, and I hope you will grant me generous absolution. The fact is that, until quite recently, when your invitation to your Birthday Party set me thinking and inquiring, I knew very little about the magnitude, the variety, and the essential importance of this Great Home Industry and its ancillary trades and bye-products. I have heard various members of my Family speak with interest of their visits to the great Beckton Gas-Works near Woolwich. But you know what it is; if you haven't seen a thing for yourself you don't get the same interest created in you by what you hear from other people. So I made pretty full inquiries and learned a great deal about the Gas Industry which, frankly, has aroused much interest in my mind. Therefore, I am very glad to be here this evening and to have paid visits to-day in Leeds to works where I have seen with what care and skill apparatus is designed and made and tested for use by the gas consumer—made and tested in such a way as to secure the maximum of safety, efficiency, and hygienic quality. And I was equally pleased to visit the Department of your Corporation which concerns itself with good service to the customer, and I should like to congratulate the Gas Committee and its Chairman—your President—on the spick and span condition of all I saw. I would also like to say that I have had the advantage of reading the Address which Major Kitson gave you this morning, and that materially furthered my education in the national services of the Gas Industry in days of peace as well as in days of war.

I was much interested also to read what that great scientist, lawyer, and administrator, the late Lord Moulton, said as to the part played by the Gas Industry in making it possible for us to win the war and as to the indispensability of the Industry to our manufacturers. It is both striking and interesting.

Gas Brings a New Era.

I need not, I am sure, go over all that ground this evening, as it was well covered in your President's Address this morning, so I will, if I may, just comment on a few points which struck me in my study of your history and position. The first thing that struck me is the tremendous change brought about in the lives of all the peoples of the world by one invention connected with your business. I refer to the invention of the gas engine, more frequently described as the internal combustion engine. If the stationary Otto-cycle gas engine had not been invented and perfected there would have been no motor-cars to-day, no aeroplanes or airships, no speed boats. In other words, the era of speed owes its birth to the Gas Industry's development of the internal combustion engine. Of course, some of you, unlike myself, can remember the days when there were no motor-cars, aeroplanes, or speed boats, and can realize more vividly than I can the revolution effected by their introduction.

but I have imagination enough to realize well enough what it would mean to be without them.

Then there is the change effected in the air of our towns and cities by the substitution of gas for raw coal for cooking and heating, and the development of gas and electric power in place of steam engines in factories.

Here again, the older of you know more about that change than I do, for I am told that thirty or forty years ago the atmosphere of our cities was far more foul and gloomy than it is to-day. Well, all I can say about that is that, however much may have been achieved, I think there is plenty more to be done yet, especially in the great industrial areas, to free the inhabitants from gloom and grime and so increase both their efficiency and their happiness.

The last point that struck me was the way in which electricity and gas, while rivals, I believe, for some lines of business, are complementary and essential to each other in the services they render to the country. The electric spark from the magneto is of great service to the internal combustion engine; the gas furnace is a valuable part of the electric lamp and cable makers' equipment, the electric motor finds its uses on the gas-works, and so on through the whole field of production and distribution. Moreover, while electricity provides the X-ray in our hospitals, the manufacture of gas gives us, as bye-products, drugs and disinfectants. Gas and electricity are, indeed, sister servants of humanity—I was going to say twin servants, but I realized that there was a disparity in age—and the older servant is no less indispensable than the younger. I was very greatly struck throughout my recent visits to a large number of factories by the great variety of ways in which gas is utilized in industry.

To mention but a few of those that came under my notice. I saw gas being used most successfully in a variety of processes in laundries, printing houses, chemical and general engineering works, jam and confectionery factories, and in the textile, tailoring, wireless, glass and pottery industries, with great advantage to the environment and the conditions in which the employees carried out their work. At many works, too, I saw gas used for purposes other than the actual manufacturing processes—for example, in factory canteens and in the factories themselves for heating, lighting, or cooking, but I was most interested of all to see it being used for refrigeration. Using heat to produce cold is certainly surprising.

It is because I know how valuable a servant to the community is the Industry which you represent, and which your Association exists to serve, that I have much pleasure in proposing Many Happy Returns of the Day to the Association and health and prosperity to the Gas Industry, coupled with the name of your Chairman and President, Major Geoffrey Kitson.

Strength of the Gas Industry.

The President, responding to the toast, said: I have had placed upon me by the Gas Industry the most responsible and pleasant duty of replying to the toast so generously proposed by your Royal Highness. This is a special occasion, being the 21st Anniversary of the foundation of the British Commercial Gas Association.

For a long time to come, the Industry will remember that your Royal Highness was with us on the occasion of this anniversary, and that you did honour to the Gas Industry by proposing this toast. The British Commercial Gas Association, so many of whose members are with us to-night as our guests, exists to deal with the Gas Industry's problems of selling, and to remind all those of us operating in the Industry of our duty of service to the people.

On our 21st Anniversary I do not propose to give you a history of the Association. It is very interesting if you happen to be a member of the Association, but rather would I refer to matters which seem to me to be affecting not only this but every industry, and to some of the points in relation to this Industry which on too many occasions seem to me to escape the notice of the general public. For a long time past, and all through the recent years of depression, gas stock has stood high, and the Industry has justly felt proud of this fact. During the more recent improvement industrial share values have gone up and gas shares have moved forward in the same substantial way, and we have evidently come to the stage where the trading community has decided that things are better. There has been a marked improvement in business sentiment here and overseas in the last few weeks. It is to be hoped that it will very soon be fully justified, and that we shall see results not only on the Stock Exchange but on every order book in every trade. But we must certainly assure ourselves that all the restrictions placed upon our Industry have been removed before we lead ourselves to believe that times of prosperity are again upon us. It is rather difficult, when we are seeking a way out of our troubles, to get away from what very often amounts to nothing but localized knowledge; but I think the facts are as I have stated them.

Your Royal Highness has pointed to many of the salient facts which relate to our Industry. I would call the attention of this company to the recent Board of Trade figures relating to the Gas Industry, because they are distinctly encouraging when we think of the times we have been going through. For the past year they show an increased output by the Gas Industry of 707 million c.ft., and there are 214,000 more consumers of gas in this country.

I have previously reminded the members of the Association this morning that our Industry represents £180,000,000 of British capital, that we use 18 million tons of coal per year, and directly employ as many as 100,000 men. Both the engineering and the distribution sides of the Industry are attending to the problems of the business as they present themselves, and in every way they are taking stock of the position. The work of our conference to-day has been mainly concerned with the sales of gas in industry, and there is much evidence to show that there are many more channels, as yet unknown to the public at large, being explored for making use of this national fuel in our factories and workshops—channels which even the Gas Industry itself had not considered until recently. There is a certainty that they will be developed to the direct benefit of the coal industry in the country as a whole.

On the distribution side far more than the general public realize that the Gas Industry is a barometer for the state of affairs which exists in the country. This side of the Industry has constantly to meet new demands for a wide variety of appliances, and it is gratifying to me to know that the Industry has not been a party to the " buy cheap " movement which has been so prevalent and which has been forced upon the country by so many who have to distribute goods to the public. That policy carried too far cannot be good for the wage earner, it cannot be good for the manufacturer, and certainly in this country it would be a real danger to the gas consumer.

Your Royal Highness has had a more than strenuous day in the interests of this Industry, and we very gratefully acknowledge the trouble you have taken to see so much of our work. The encouragement you have given us this evening and the way you have alluded to the Industry will be a very real help to my Association, on the occasion of its coming of age, to go out into the world still farther and with even greater determination to serve the British public with a British product.

The Rt. Hon. L. S. Amery, P.C., M.P., proposing the " City of Leeds," said the presence of His Royal Highness, Prince George, was another instance of the interest that His Majesty and all the Royal Family had continuously shown in every aspect of the life of our country. The interesting speech which Prince George had made would indeed be very helpful propaganda for the Industry.

The Lord Mayor of Leeds (Alderman F. B. Simpson, J.P.), whose name was coupled with the toast, remarked that reference had been made during the conference on many occasions to electricity, but while there was undoubtedly room for parallel expansion of both gas and electricity, no development could be regarded as a progressive one which did not result in extending the convenience of the public and increasing the use of labour. He expressed his gratitude to His Royal Highness Prince George for spending such a busy day in Leeds.

The toast of " The Visitors " was proposed by Alderman R. C. Davies (Leeds).

Sir David Milne-Watson, who responded, said it would be agreed that there had never been a more successful conference in the history of the Association, and it would long be remembered if only for the presence of H.R.H. Prince George on the present occasion. Leeds was the Mecca of the Gas Industry, because one of the most important branches of work carried on in connection with it was the research work done with such efficiency in the University. The Gas Industry as a whole owed the Leeds University a great debt of gratitude for what it had done in the past and was continuing to do.

Sir Francis Goodenough proposed a vote of thanks to Mr. Shapley, the Engineer to the Corporation Gas Department, and his staff, for the yeoman service they had rendered in the organization of the conference.

Mr. C. S. Shapley, briefly responding to the vote of thanks, said the words of kindness which had fallen from the lips of Sir Francis were much appreciated not only by himself, but by his staff, many of whom were present. The work had been hard, as many gas engineers who were present and who had entertained the B.C.G.A. knew, but those engaged in the Gas Industry were used to this, as it was only by strict attention to details and putting forward a bold front that gas stocks in the country stood firm, in spite of the antiquated legislation under which they were working, and the boost that had been given to the Grid scheme.

Prince George at the Works of Wilsons & Mathiesons, Ltd.

On Tuesday of last week, at the Armley Works of Messrs. Wilsons & Mathiesons, Ltd., H.R.H. Prince George made a thorough inspection of the chief departments, opened the new offices, and had luncheon with the Directors. Among those present were Major G. H. Kitson, President of the B.C.G.A. and Chairman of the Leeds Gas Committee, the Lord Mayor, Sir Francis Goodenough, and Mr. C. S. Shapley, General Manager of the Leeds Gas Department.

It was a great disappointment for Mr. William Mathieson, the Chairman, that owing to illness he was unable to receive the Prince. Mr. William Mathieson, junior (Managing Director), acted in his stead and presented his colleagues on the Board.

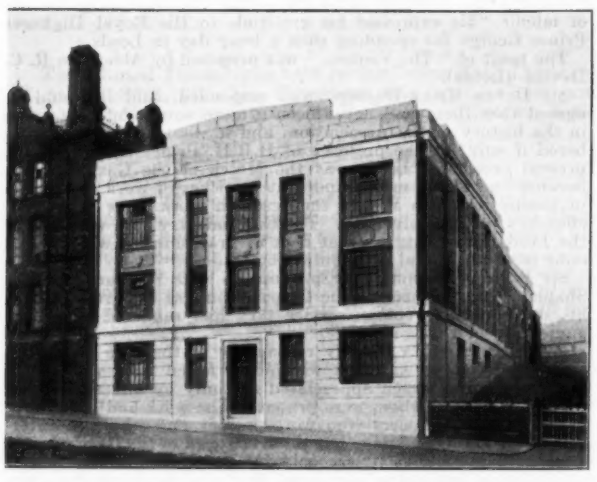
Among others presented to Prince George during his tour were Mr. John Fleming, foreman, and Mr. Titus A. Bell, who has been with the firm for nearly 57 years.

The Prince saw the press tool shop and the large press shop where standard pressed steel stampings are prepared for the various Radiation works. In this shop there are large and small presses, varying in power up to 300 tons. In the radiant-making shops the manufacture of "Sunbeam" and "Sola" radiants was shown. In the brass-finishing shop Radiation "Regulos" for "New World" cookers are made. This delicate instrument is made with almost the precision of a watch, the tools used being checked up several times every hour to ensure absolute accuracy. The "Regulos" are assembled here and thoroughly tested to the varying temperatures before being passed for use. The Scotch Foundry and the bath moulding shop were seen, and the Prince witnessed the moulding of gas stove castings.

Having inspected the Foundry, the Prince proceeded to the new Offices, which he opened.

The New Offices.

The new offices are built of red brick and Girling stone, the architecture being on modern lines and of simple though dignified appearance. The area of the site is 1600 sq. yards. Inside, one receives a pleasing impression of spaciousness and good lighting. The ground floor, owing to the sloping nature of the site—incidentally, the foundations are hewn out of solid rock—is confined to the front portion of the building, and consists of a large entrance-hall, main staircase, reception rooms, and a staff dining-room. The control rooms for heating, lighting, and the automatic telephone are also on this floor. On the first floor are the private offices and a large general office, round which there is a balcony floor. Fireproof strong-rooms are



New Offices of Messrs. Wilsons & Mathiesons, Ltd., at Armley.

provided. All the typewriters are in separate rooms at the side of the main office, in order to obviate noise.

Most of the second floor is taken up by a showroom of generous dimensions, in which attractive examples of the Company's products are on view. There are also on this floor a photographic studio, a test-room for heating and other appliances, a private dining-room, and a kitchen. The entrance-hall, staircases, corridors, and landings are done in polished mosaic, with tiled dado, and all floors are served by an electric lift. The general heating installation is by low-pressure hot water actuated by gas boiler, while the secondary heating is by gas fires provided and installed by the proprietors.

In the panelling and furnishing of the dining-room, reading-room, and private offices a faithful imitation of the Elizabethan period has been carried out. Doors, fireplaces, carpets, and decorations are all in keeping with the scheme that has been adopted. So cleverly have the furniture and panelling been "faked," even to the extent of the scratches and defects resulting from long use, that none but an expert could detect that they are not genuine antiques.

In an interesting speech, Mr. Mathieson reminded the Prince that Mr. Henry Wilson, who was associated with the business in the 'eighties, invented the first independent gas fire.

Mr. Mathieson then handed to the Prince a silver statuette, "The Yorkist," representing a Yorkshire yeoman of the time of the Wars of the Roses. It had been

The "Yorkist" Presented to Prince George.

chosen to typify the loyalty of Yorkshire folk to the reigning house. The Prince briefly replied.

Historical.

In 1854 Mr. Charles Carr Wilson, after completing his training as apprentice and journeyman tinsmith, commenced business on his own account in Woodhouse Lane, Leeds. Early in his career Mr. Wilson became convinced that coal gas had a great future for heating purposes, particularly for domestic use, but it was not until about 1870 that he was able to turn his attention to the application of gas for household articles.

In 1877 Mr. Wilson was awarded the Silver Medal at the South Shields Exhibition (the first Gas Exhibition ever held) for a gas-heated bath, and in 1878 he was awarded two medals at the Birmingham Gas Exhibition for gas cookers.

In 1880 the first independent gas fire was invented by Mr. Henry Wilson, Mr. Charles Wilson's son, who was associated in the business.

During the early years of Mr. Charles Wilson's business in Leeds, the castings which he required had been manufactured in Scotland, but early in 1888 Mr. Wm. Mathieson brought his foundry—the Scotch Foundry—to Armley, Leeds.

In 1898 the Gas Stove Works of Messrs. Charles Wilson & Sons were moved to a site adjoining that of the Scotch Foundry at Armley, Leeds, and in 1899 the two firms became amalgamated as a Limited Company under the name of Wilsons & Mathiesons, Ltd. Finally, in 1920, Wilsons & Mathiesons, Ltd., joined Radiation Limited.

In common with other gas appliance manufacturers, Wilsons & Mathiesons have never spared themselves in their endeavours to popularize gas appliances and have striven by constant research and experiment to develop various types of gas apparatus.

Industrial Gas—Achievement and Prospect

By A. W. SMITH, F.C.I.S.,

General Manager and Secretary, City of Birmingham Gas Department.

The value to gas undertakings of the industrial heating load is becoming generally recognized, and the factors governing its development are well known. It is no longer necessary, therefore, in a paper on this subject to suggest either to gas undertakings or their prospective customers the adoption of methods which are in an experimental stage.

It is desirable, however, to review periodically the reasons for this development; to re-examine the successes and failures which have attended our efforts; and to investigate the future possibilities of this important branch of the work of the Gas Industry with a view to ascertaining if it be possible to increase existing consumptions and obtain new consumers of gas for industrial purposes.

Why are many of us so keen on extending the industrial load? Because we believe this load to be an attractive one, and a sound business proposition both from our own point of view and from that of our customers. Finally, it is no exaggeration to state that its development is of definite national importance.

It is sometimes argued that industrial loads are unattractive because they are not sufficiently constant owing to trade fluctuations. It is, of course, true that all industries are subject to ebbs and flows of trade, and all have been affected more seriously than ever before by the present depression. But I suggest that those who argue from this fact that gas undertakings ought not to lay themselves out for the industrial business are looking at the question from too narrow a viewpoint. They have become a little too accustomed to the continuity of a good many of our loads, particularly on the domestic side, although I should imagine their complacency in this respect has been disturbed a little in recent years.

It is customary for many commercial concerns to build up their business mainly on unit sales. Repeat orders from the same firm may or may not come along, and in the same way it may be necessary for us to obtain some industrial loads even with the knowledge that we are only going to retain them for a limited period. Of course, business of this nature has to be carefully considered in relation to the necessary expenditure on mains, &c.

Taking the broader view, all our loads are subject to depression to a greater or lesser degree; any industrial load may be cut off or reduced at any time, due to a radical change in the method of operation in a works organization, a contingency which in Birmingham has had to be met on many occasions.

Those who have been concerned with the experimental and development work which has so far been carried out in connection with industrial gas are convinced that in putting forward gaseous fuel to the industries of the country a heat service is being offered which, with the widest possible range of applications, is second to none. It must also be remembered that we are making the best use of coal, our national source of energy.

Are we not compelled in view of the trade depression to make special effort, exploring every avenue of utilization to secure a greater use of gas in industry? We are undoubtedly one of the most likely media through which the coal industry may be re-vitalized, and as the coal industry is one of the primary industries of the country, our efforts must help towards the restoration of prosperity in this country. The use of raw coal in a large number of our industries can never regain the place it once held, as those industries demand a fuel which is more efficiently burned, easily accessible at the points of usage, with minimum storage space, clean, and controllable within very fine limits—conditions which town gas meets with many more advantages than any other form of fuel.

The Gas Industry has been responsible to a great extent for the lightening of the load of domestic drudgery. It has also been, and can be to a far greater extent, a medium for the reduction of works drudgery and the improvement of surroundings of workpeople, so far as the application of heat is concerned, accompanying this with refinement of control and accuracy of working, at reasonable cost.

To look back over the work which has been carried out, and to be aware of the rapid increase in interest and new business which has occurred within the last two or three years, will make one realize to some extent, in spite of the present depression, the numerous possibilities which are still available and which can be turned into certain consumptions by a combination of experimental work, satisfactory practical installation and service, with a reasonable commercial and financial policy.

Organization.

The Birmingham Gas Department was among the first gas undertakings in the country to realize the value of an industrial load, and the policy put into operation about 23 years ago with a view to building up a load of this kind has, I consider, been successful, inasmuch as our sales of gas for industrial heating purposes had reached for the year ended March, 1930, the figure of 3210 million c.ft.

We sold during the December quarter, 1931, no less than 1,028,595,000 c.ft. of gas to 5761 factory consumers, representing 27·5 p.ct. of our total sales for that quarter. Our sales of gas to the industries of Birmingham now approximate 4000 million c.ft. per annum.

The city is, of course, fortunate in having so many varied trades and processes carried out within its area, and we have found that consumptions lost through the decline of a process or trade have been regained by the introduction of new trades and processes with a continued tendency to increase. At present, of course, we are suffering from the general trade depression, but not apparently to the extent experienced by gas undertakings serving areas confined more or less to specialized industrial operations.

Our policy has been, and I hope always will be, one of intensified service. We are ready to give as much attention to what may appear to be a small inquiry as we are to the large one. This has reacted to our benefit, as often our thorough attention to the small inquiry has led to our being entrusted with larger inquiries in the same works.

The staff dealing with industrial business has been chosen from men who have made or have been prepared to make a special study of the application of gas to all kinds of industrial heating appliances, from the small soldering stove to the large forge furnace. They have had to be men with open minds, ready to assimilate knowledge of special conditions, and apply their knowledge of gas utilization to the special conditions demanded by the prospective customer. They have also to be ready to give freely of the knowledge they have, and not hedge it round with any idea of secret or special processes. It is also necessary for them to possess the qualifications of the salesman—*i.e.*, character, appearance, common-sense, tact, and the capacity for dealing with many types of men, including managing directors, works managers, chemists and metallurgists, foremen and workmen. Particular mention is made of the workmen, as so much depends in negotiations for new business on their attitude to what in all probability is new to them.

An Essential Difference.

It may be that in Birmingham we have been fortunate in the continued service of our representatives handling industrial matters, as it is always necessary for a gas undertaking to "live" with an installation after it has once been put in, with a view to the maintenance of the consumption first obtained.

There is an essential difference here between ourselves and the furnace or industrial appliance manufacturers. They have to make their profits on the installation at its commencement—our business is continuous, providing the apparatus is satisfactory and remains in use.

If an industrial gas engineer is on sufficiently satisfactory terms with the consumers' representatives in the works, it is found that he is consulted on any proposal involving the application of heat, especially if he can be relied upon to give a reasoned proposition for all the forms of heat application whether gaseous, solid or liquid fuel, or electrical energy.

Showrooms and demonstration rooms are necessary adjuncts to the development of industrial inquiries. To-day a large percentage of inquiries can be met from standard apparatus, and it is part of our policy to supply a standard appliance or furnace whenever this can be approved, but at the same time we are prepared to carry out experimen-

tal work of a practical nature either in our own demonstration rooms or on consumers' premises, in pursuit of a new load, if the inquiry is of a new or special nature—this leading possibly to the design and erection of a special furnace. On many occasions when work of this kind has been undertaken, the furnaces have become standard, and have been handed over to furnace makers for inclusion in their standard apparatus.

We also supply and install ancillary apparatus such as gas and air compressing plant, or temperature measuring and controlling apparatus by any recognized maker, providing we can conscientiously recommend same.

A specially organized scheme of service to our industrial consumers (numbering, as previously mentioned, over 5000) was inaugurated about four years ago, whereby one of our industrial service engineers visits each works periodically (the firm being advised previously of his call) when an inspection of all industrial gas appliances is made and recorded in our card system. Observations on the working of any plant are invited, and recommendations made by our representative concerning any improvements which may be possible with existing plant, or by the installation of new furnace apparatus.

This service has undoubtedly been appreciated to a very great extent by our consumers, and has given us the opportunity of replacing a large amount of out-of-date apparatus. Further, so far as statistical and record purposes are concerned, we have details of practically all the types of industrial appliances used in our area of supply.

This service has also been of great value in meeting competition, as we have on many occasions been able to find out when a consumption is threatened. This information has enabled us to approach the firms concerned, and we have thereby been enabled to carry out a large number of tests on industrial gas apparatus which may have been installed for some years, and to ascertain its efficiency in use, with a view to recommending reconditioning of existing plant or the installation of more efficient apparatus when a change of fuel has been contemplated.

A further after-sales service, which has been of great value to the consumer and ourselves alike, is our repair service. We undertake repairs to any type of industrial appliance. This not only gives us the opportunity of keeping plant in a satisfactory condition, but also enables us to incorporate improvements both in the design of the plant and in the materials used. Further, in a large number of furnaces during rebuilding we have been enabled to introduce improved refractories and insulation material, which has led to economy in gas consumption; for in the industrial field, as in the domestic field, our worst enemy is the inefficient, extravagant, and unsatisfactory gas appliance.

Through all this work we endeavour to make a co-partner of our prospective or actual consumer, and probably we are in a unique position, as in addition to the services rendered by the department so far as industrial gas applications are concerned, the services of the Industrial Research Laboratories as a whole are available to the consumers of the city, and no doubt bring us into more constant touch with our consumers than would be possible without the services provided by these Laboratories.

Our services, as you are no doubt aware, have been called upon by a number of other gas undertakings in various parts of the country, with a view to assisting them in the retention and extension of their industrial loads. In every case Dr. Walter and his staff have endeavoured to apply our own methods of organization and service, and except in districts which have been severely hit by trade depression, have been very successful. We look forward to being of greater assistance to these undertakings when trade begins to improve.

Large Consumptions.

At Midsummer, 1932, the Birmingham Gas Department had one consumer taking gas at the rate of over 200 million c.ft. per annum, used in the production of bicycles, motor bicycles, cars, tools, and guns; two consumers each at the rate of 120 million c.ft. per annum, one for motor car production and the other for motor car and cycle lamps and general electrical accessories; and three consumers each taking gas at the rate of over 40 million c.ft. of gas per annum—one for food production, one for the production of nickel and nickel alloy strip and wire, and the other for the manufacture of electrical machinery and apparatus.

Seventeen consumers were also consuming at the rate of 20 million and over, ten at 16 million, ten at 12 million, twenty-six at 8 million, and no fewer than seventy-nine who required at least 4 million c.ft.

Among the sixty-nine largest consumers, twenty-two firms are connected with the motor car, motor cycle, and bicycle trades, and these account together for a consumption of nearly 600 million c.ft. per annum. Other trades responsible for large consumptions are as follows:—

		Million C.Ft. per Annum.
Food production	4 consumers account for	100
Electrical apparatus	7 ,, ,, ,,	148
Motor lamps and accessories	3 ,, ,, ,,	152
Brass foundry	7 ,, ,, ,,	108
Aluminium	4 ,, ,, ,,	56
Gas apparatus manufacture	2 ,, ,, ,,	44
General engineering	20 ,, ,, ,,	292

It is now my intention to place before you particulars of certain installations, some of which are recent, some we have held for a long period. It is absolutely impossible to give details covering the whole of our recent work, and it has been necessary for me to take specific examples to bring out two points—first, the fact that new apparatus is continually being installed, and, secondly, to endeavour to show the value of installations which have been held for some time.

Carburizing Furnaces.

Dr. Walter, in his recent paper before the Institution of Gas Engineers, gave an illustration of a battery of three carburizing furnaces recently installed at the works of Messrs. Wolseley Motors, Ltd. He also gave some interesting facts and figures with regard to experimental work carried out on these furnaces and which was in process at the time of the writing of the paper.

We have since secured a load at the works of the above firm which will amount to upwards of 100 million c.ft. of gas per annum. This load is the direct result of the experiments which we were given the opportunity of carrying out to ascertain whether town gas could be applied with improvement in efficiency and economy to their furnace installation, which was then running on other fuel.

For some months past now the heat treatment shops in these particular works have been running entirely on town gas, to the satisfaction of the metallurgists and engineers in charge of the very big production heat-treatment work through these shops.

Fig. 1 shows the completed installation of six town gas fired carburizing furnaces with automatic control and

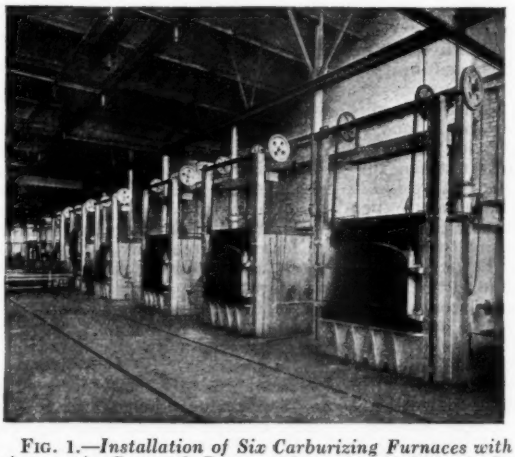


Fig. 1.—*Installation of Six Carburizing Furnaces with Automatic Gas and Damper Control installed at the Works of Messrs. Wolseley Motors* (1927), *Ltd., Birmingham.*

charging machine, on three of which furnaces figures of tests have already been reported. Other furnaces in the heat-treatment shops at the Wolseley Works include a battery of re-heating furnaces, both oven and rotary types.

The whole of the temperature control and general pyrometer equipment is controlled from one room situated within the heat-treatment shop.

Ceramic Firing.

One of the most interesting installations of gas furnaces in Birmingham at the present time is the tunnel kiln designed by Messrs. Gibbons Bros, Ltd., installed in the works of the Midland Electric Manufacturing Company. This kiln was designed for running on either producer gas or town gas, but although the kiln was running for a period on producer gas with comparatively good results, this Company have decided to use town gas, and the kiln has been running on town gas for over twelve months with every success. It is used for the firing of electrical insulators employed by this particular Company in the making of their well-known switches and other apparatus. The average gas consumption of the kiln is 2500 c.ft. per hour, and 4000-5000 lbs. net weight of insulators necessitating 10,000-

12,000 lbs. additional refractory structure, proceeds through the kiln in a 24-hour day. From this remark it will be gathered that the kiln is running continuously, the temperature only being let down at holiday periods, and only then if repairs are necessary.

Figs. 2 and 3 show the kiln and general burner arrangement and also from the charging end the method of loading the insulators with suitable carrying plates.

FIG. 2.—*Dressler Town Gas Fired Tunnel Kiln, firing Ceramic Ware at the Midland Electric Manufacturing Company, Birmingham. General Arrangement of Burners shown.*

Further, the Midland Electric Manufacturing Company have recently changed over their method of enamelling the iron cases for electrical switches, &c., from the in-and-out type of stove to the conveyor method, with thermostatic temperature control. Special features have been arranged in the conveyor stove designed by Messrs. F. J. Ballard & Co., by which either dipped work or hand-sprayed work can be fed into the stove as desired.

General Engineering Work.

The two low-pressure gas furnaces installed at the works of Messrs. Taylor & Challen, Birmingham, shown in Fig. 4 are typical of many similar installations in Birmingham works where furnaces are required for the carrying-out of carburizing, re-heating, and general tool heat-treatment work. In this particular instance the furnaces have replaced two old type air blast furnaces, one of which is shown in fig. 5.

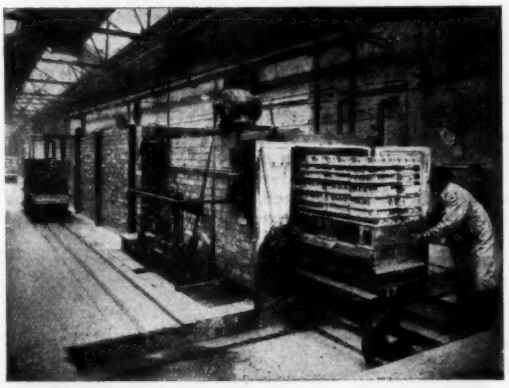


FIG. 3.—*Dressler Town Gas Fired Tunnel Kiln, firing Ceramic Ware at the Midland Electric Manufacturing Company, Birmingham. Charging end of Tunnel shown with Car and Structure necessary for Loading.*

These two pictures are submitted as typical examples of what may be done in the improvement of works plant by the introduction of more modern types of furnaces. A change-over from gas and air blast to low-pressure gas may seem a doubtful proposition, but with the introduction of new and varying types of steel to meet special requirements and the demand for accuracy and control of temperature, a low-pressure gas-heated furnace has many advantages.

It will be seen that each of the new furnaces is fitted with a thermocouple, with pyrometer apparatus in the control box at the side.

These furnaces are installed in a comparatively small shop, and one point gained in the change-over from air blast methods is the reduction in noise, both in the running of the blowers and the burning of the gas in the furnaces. The blower shown in the picture is the only one of three which has been retained for supplying air to a blowpipe.

Motor Cycle and Cycle Manufacture.

The firm of Components, Ltd., of Bournbrook, Birmingham, have been customers of the Birmingham Gas Department for many years. They are the makers of the well-known "Ariel" bicycles and motor cycles, and for a number of years their main heating processes, such as brazing, case-hardening, hardening, and japanning, have been carried out with gas.

Two or three years ago this firm decided to change their method of japan drying of wheels, mudguards, &c., from the ordinary in-and-out method in standard type japanning ovens to the convevor method, and further decided, to our regret, to install oil fuel as the heating medium. We were informed shortly afterwards that the new "Carrier" conveyor oven was giving them every satisfaction, and that the cost of running was lower than was the case with the older method with gas.

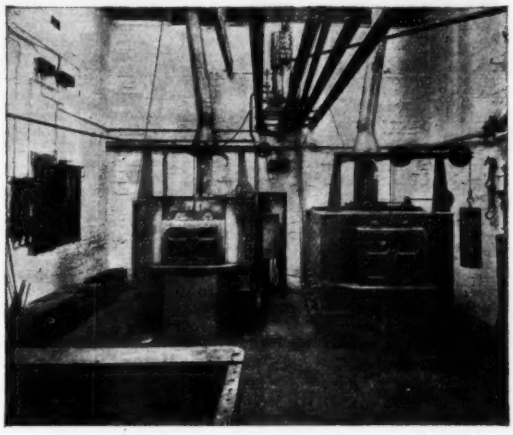


FIG. 4.—*Installation of Two Low-Pressure Gas Heated Oven Furnaces for Carburizing and Re-heating Operations at the Works of Messrs. Taylor & Challen, Ltd., Birmingham.*

After a year or two's working, however, it was found that the special tubes in the oil-fired heater were continually burning out, and were an extremely costly item to replace, and the makers of the plant were approached with a view to a gas heater being installed in its place.

The change-over was carried out over six months ago, and although this has made a change from an indirect system of heating to a direct-fired system in which the products of gas combustion are in contact with the work to be dried, the japanning results are quite up to the standard of the oil-fired heater. So far as we were concerned we ex-

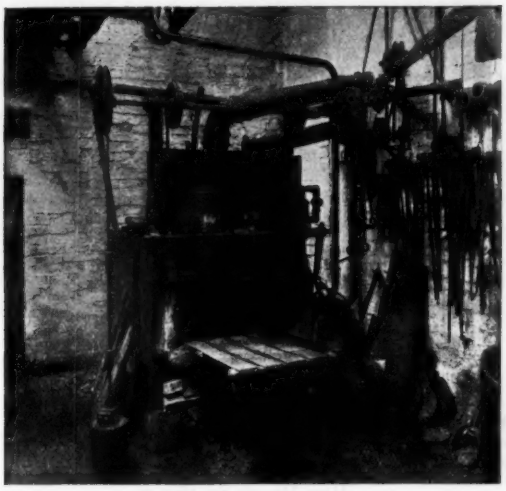


FIG. 5.—*Installation of One Air-Blast Oven Furnace at the Works of Messrs. Taylor & Challen, Ltd., Birmingham. This Furnace, with another similar Furnace, now replaced by the Furnaces shown on fig. 4.*

pected this, although the users had some slight doubts, as this method was really only a reversion to the ordinary method of heating in the japanning stove.

A further advantage has been gained in that the gas-fired heater is installed at floor level under the oven itself, whereas the oil heater, because of its size, had to be placed in another part of the works, thus occupying valuable floor space.

The experience of Components, Ltd., with oil-fired heaters on conveyor stoves is not an isolated one. We have one other installation of a similar nature in Birmingham, and we are aware of others in various districts. This ex-

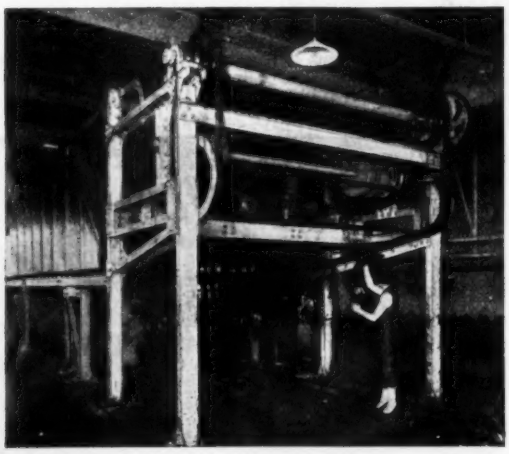


FIG. 6.—*Discharging End of "Carrier" Gas Heated Conveyor Type Oven for Japanning Motor-Cycle Frames, Wheels, &c., at the Works of Messrs. Components, Ltd., Birmingham.*

perience has meant that in new propositions of a similar nature, town gas is having foremost consideration, whereas a short time ago fuel oil only was being considered.

The conveyor stove referred to is 60 ft. long and has a consumption of approximately 1300 c.ft. of gas per hour—and with reduction of labour charges and maintenance costs is showing a saving of over 4d. per hour, compared with the costs of running with fuel oil.

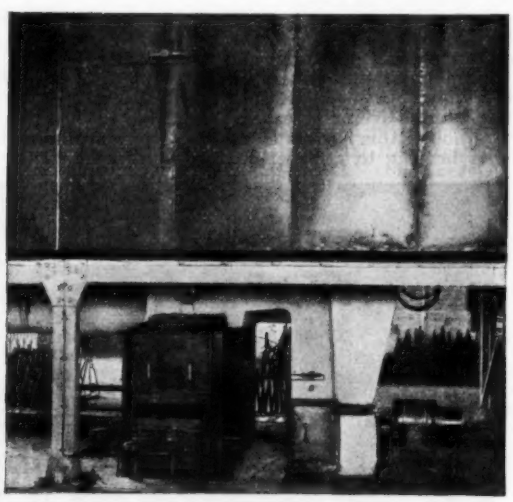


FIG. 7.—*Gas Fired Air Heater Unit and Part of Conveyor Oven installed at the Works of Messrs. Components, Ltd., Birmingham.*

Fig. 6 shows a general view of the conveyor stove from the discharge end, and fig. 7 a close-up view of the gas-fired air heating unit.

HOT BRASS STAMPING.

The works of Associated Pressings, Ltd., Springcroft Road Works, Hall Green, Birmingham, are representative of a modern all-gas factory for the manufacture of hot brass stampings.

Before the factory was built, the Department was consulted on the question of the best type of furnace to use for the heating of billets. A special furnace was designed and an experimental furnace constructed and tried out in the laboratories. This proved to be most successful. From this design the furnaces shown in the photographs, figs. 8 and 9, were installed by the Department.

FIG. 8.—*Installation of Six Gas Fired Billet Heating Furnaces with Production of Hot Brass Pressings at the Works of Associated Pressings, Ltd., Birmingham.*

It will be noticed, particularly from fig. 9, that the furnace is placed in close proximity to the press, enabling the operator to transfer the billet from the furnace to the press in a minimum period of time. This is only possible by the use of gas in the specially designed furnace which

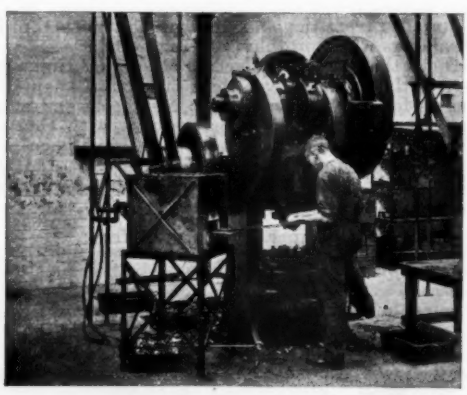


FIG. 9.—*Close up View of Furnace and Press for the Production of Hot Brass Pressings at the Works of Associated Pressings, Ltd., Birmingham.*

incorporates a number of novel features, including a suitable amount of insulation material.

In spite of the small size and comparatively low gas consumption of the furnace, the output is greater than the speed at which the man can operate the press. An aver-

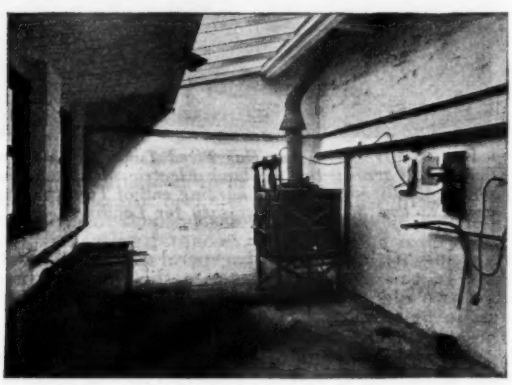


FIG. 10.—*Natural Draught Gas Heated Oven Furnace with Pyrometer Equipment for the Heat Treatment of Special Dies for Hot Brass Pressings. (Works: Associated Pressings, Ltd.)*

age output is approximately 40 gross of stampings per 8-hour day per man.

The dies are made from a special alloy steel and hardened in a gas-fired furnace fitted with pyrometric control, shown in fig. 10. The furnace, when built with an extra amount of insulation, is typical of a low-pressure gas fur-

nace designed for the special treatment of these steels. Temperatures as high as 1250° C. can be obtained in this furnace.

The maximum output of the above firm at present is 10 tons of finished stampings per week, but additional plant is being installed at the moment to increase this by 50 p.ct. The works have been planned to enable the present output to be increased by three or four times.

This particular installation is one of the most recent in Birmingham, where a large number of works are engaged in the production of brass pressings, and in practically every case gas is used as fuel in the furnaces for the heating of the billets prior to pressing. It is also used for heat treatment of the dies and for heating the dies while in the presses.

This operation illustrates notably one of the trade changes to which I made earlier reference, as it has replaced to a great extent the older method of brass casting. We installed a large number of gas heated casting furnaces just prior to the war, the consumption of many of which we lost during the period of high-priced gas ruling just after the war period. Our consumptions of gas for the hot

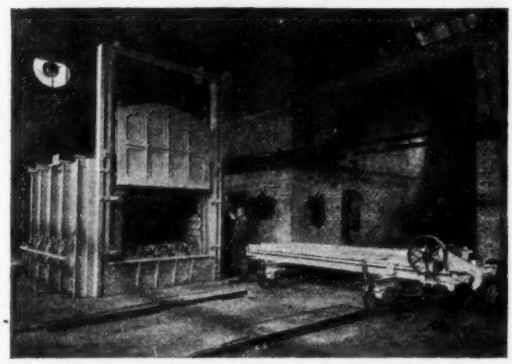


FIG. 11.—*Gibbons Low-Pressure Gas Recuperative Oven Furnace for Carburizing Large Roller Bearings installed at the Works of British Timken, Ltd., Birmingham.*

stamping process now amount to a far greater figure than ever the consumption for melting furnaces reached.

MANUFACTURE OF TAPERED ROLLER BEARINGS.

An interesting example of the exclusive use of gas occurs at the works of the British Timken, Ltd., Aston, who manufacture high-grade tapered roller bearings of all sizes. Their reputation has been founded on two main features—accuracy and quality. These have been obtained largely by the use of highest grade material, scientifically heat-treated.

One or more heat treatments are necessary for the essential parts of a roller bearing—viz., cone, cup, and rollers. Gas as a fuel is used throughout for such processes, owing

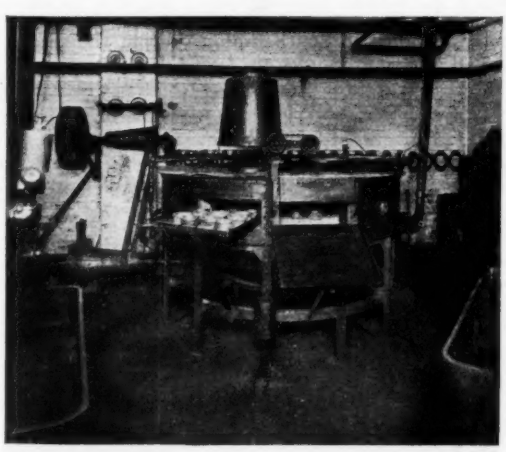


FIG. 12.—*Rotary Furnace with Gas and Air Blast Burners for the Heat Treatment of Roller Bearing Components at the Works of British Timken, Ltd., Birmingham.*

to its easily controlled atmosphere, coupled with an exact temperature regulation.

The illustrations referred to in detail later show the heat-treatment shop, which has a maximum output of 120,000 components per week. The shop works on a 24-hour basis, and the average consumption of gas per annum during 1930 and 1931 was 48,616,400 c.ft.

The Company has now perfected a roller bearing for use

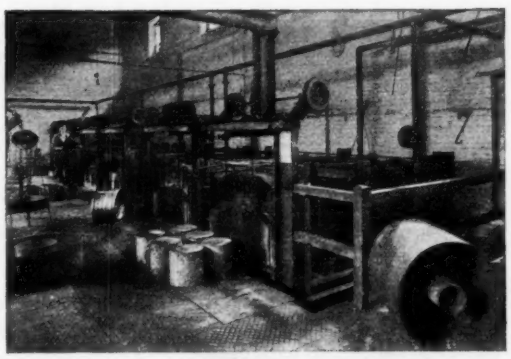


FIG. 13.—*Battery of Six (3 Pairs) Gas Heated Carburizing Furnaces Operating with Low-Pressure Gas and Low-Pressure Air for Carburizing Roller Bearing Components at British Timken, Ltd., Birmingham.*

in rolling mills. There have been numerous difficulties in the way, but these have been successfully overcome, and to cope with these large bearings a new furnace has been recently installed. Fig. 11 shows this furnace, which has a working chamber 11 ft. long by 6 ft. 6 in. wide by 3 ft. 6 in. high, and is fully equipped with automatic temperature control.

The function the furnace is to perform is probably a record in the metallurgical world—*i.e.*, carburizing for a period of 150 hours, and bearings up to 44 in. outside diameter will be treated. A bearing 28 in. outside diameter weighs approximately half-a-ton when completed. The temperature has to be maintained with accuracy and certainty during the whole of this period. A depth of case of $\frac{1}{16}$ in. is obtained with a minimum core strength of 100 tons per sq. in.

Fig. 12 shows a continuous re-heating circular furnace. It consists of a flat disc-shaped table approximately 8 ft. in diameter. The work is fed into the left-hand opening,

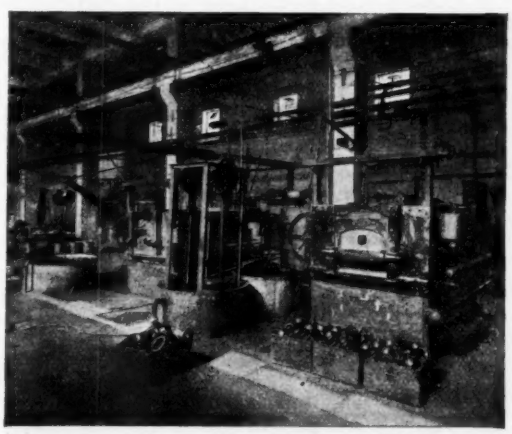


FIG. 14.—*Installation of Two Davis Revergen Type Oven Furnaces with Quenching Equipment for the Heat Treatment of Roller Bearing Component Parts at the Works of British Timken, Ltd., Birmingham.*

the table moves in a clockwise direction, and the work is taken from the right-hand opening and jig quenched. Part of the quenching machines can be seen in the foreground.

The furnace is capable of an output of 500 components per hour.

Figures as low as 1·75 c.ft. of gas per lb. of steel treated have been obtained during tests taken by the Department.

Fig. 13 shows a battery of carburizing furnaces made by Gregson Partners, Ltd., installed on these works several years ago, and fitted recently with automatic temperature control. The furnaces are built in pairs, each working chamber being 7 ft. 6 in. long by 4 ft. wide by 1 ft. 3 in. high. They are of the recuperative type, gas being sup-

plied at a pressure of 4 in. W.G. and air at 4 lbs. per sq. in.

During the Department's test a figure of 2·66 c.ft. per lb. of gross load carburized was obtained.

Fig. 14 shows two of a number of similar furnaces made and installed by the Davis Furnace Company, each having

FIG. 15.—*Battery of Rotary Hardening Furnaces for the Heat Treatment of Small Roller Bearing Component Parts at the Works of British Timken, Ltd., Birmingham.*

a working chamber of 3 ft. 2 in. by 2 ft. by 1 ft. used for the re-heating of components. They are of the well-known reversible regenerative type, and are fitted with automatic temperature control, which is so necessary for the accurate heat-treatment of modern steels to give results within the very close limits laid down by British Timken, Ltd.

Fig. 15 shows a battery of rotary barrel hardening furnaces used for the carburizing of rollers and similar small components. The components are quenched direct from the furnaces, which can be tilted over the quenching tank shown immediately under the furnace.

GLASS.

The two furnaces shown in fig. 16 are used for the heating of sheet glass for bending purposes. The smaller oven furnace, made by the Incandescent Heat Company, is used for the actual heating of the glass to the temperature required for bending into specially shaped moulds, and the longer furnace is used as a Lehr for annealing of glass after bending.

FIG. 16.—*Installation of Low-Pressure Gas Heated Oven Furnace for Glass Bending (Furnace on Right Hand), and Low-Pressure Gas Heated Oven Furnace, or Lehr, for Glass Annealing after Bending.*

These furnaces are used by a Birmingham manufacturer for the production of a speciality. It is interesting to note that other similar furnaces are in use for the bending of glass discs for the making of lamp glasses, &c.

BAKELITE MOULDING AND SIMILAR PROCESSES.

The rapid development of articles used in the electrical and other industries, and also many domestic articles now made in Bakelite moulding, has led to the use of gas in connection with the heating of a large number of the plattens in which the powder is placed for pressing. Steam heating is used in some cases, but there are a large number of presses now in operation using town gas. This particular operation has necessitated the use of very fine injectors, as the gas has to be burned satisfactorily in a confined space.

Low pressure gas is used, but the more satisfactory installations are operated by high-pressure gas or by a combined gas and air mixture system.

So far as the low-pressure gas installations are concerned, we have been called upon to supply a large number of thermostats to control the temperatures on the plattens.

FORGING OF TURBINE BLADES.

In our associations with other gas undertakings we have met with a number of very interesting operations. Referring again to Dr. Walter's paper, he gave instances of one or two installations of forging and heat-treatment furnaces in the Rotherham area, and by courtesy of Col. W. M. Carr, of the Stretford and District Gas Board, and the Metropolitan-Vickers Electrical Company, Ltd., I am able to show you an illustration (fig. 17) of a forge furnace used for turbine blades.

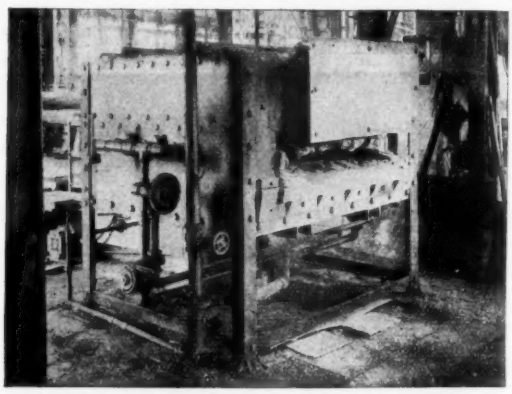


FIG. 17.—*Forge Furnace with Burner Equipment by British Furnaces, Ltd., with Separate Supplies for Purging, used for the Forging of Turbine Blades at the Works of Metropolitan-Vickers, Ltd., Manchester.*

This furnace was designed and installed by British Furnaces, Ltd., and has given satisfaction so far as the gas consumption for the production of blades is concerned, but some difficulty was experienced in regard to excessive scaling. Our staff were able to advise the addition of purging gas burners to the hearth of the furnace, and the Metropolitan-Vickers Company now express great satisfaction with the quality and cost of the work produced.

The success of this one furnace is leading to the replacement of a number of oil-heated forge furnaces by gas furnaces. It is regretted that the picture of the furnace was taken with the arch in need of repair.

CREMATORIA.

The use of gas in connection with the work of the various crematoria has recently rapidly advanced, and by courtesy of Mr. J. F. Askam, Birmingham, I am able to show two photographs (figs. 18 and 19) of the Crematorium he has recently installed in Southampton. From the second pic-

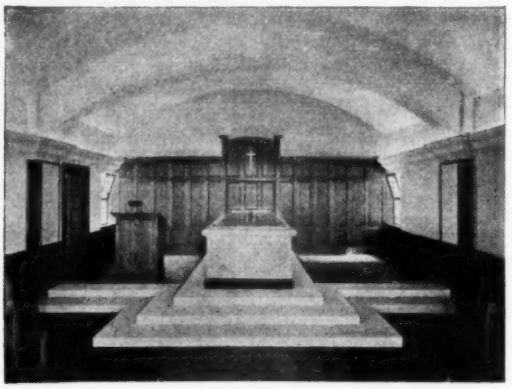


FIG. 18.—*View of Interior of New Crematorium at Southampton.*

ture (fig. 19) of the actual furnace, it will be seen to resemble a standard type of gas-heated oven furnace, with several special features.

There is no doubt that gas used as a fuel in these circum-

stances makes a far cleaner and more satisfactory proposition than solid fuel methods.

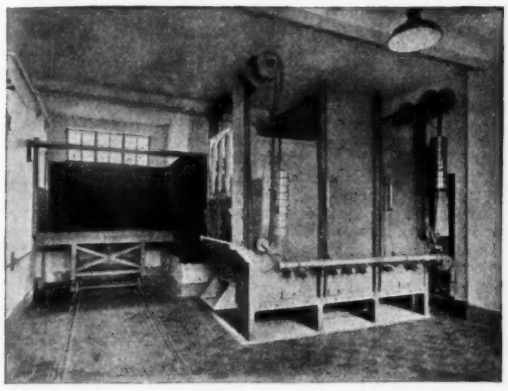


FIG. 19.—*Low-Pressure Gas Fired Crematorium Furnace recently Installed at Southampton.*

From figures which have been supplied to me it would appear that a gas consumption of just over 2000 c.ft. is required per cremation.

PROSPECT.

The possibilities of extension of industrial loads depend, of course, on several factors—principally on the following:

1. The field available.
2. The attitude of gas undertakings.
3. Competition.
4. Price.

1. So far as the available field is concerned, this varies, of course, according to the geographical situation of any given undertaking, but from our experience in Birmingham and many other parts of the country it can definitely be stated that there are very few heat processes carried out which cannot be undertaken successfully with town gas. Therefore practically all processes at present carried out with solid or liquid fuel, or producer gas, are open to consideration with town gas at suitable prices.

The Board of Trade Returns show that approximately 500 million gallons of fuel oil were imported last year—an increase of about 100 million gallons compared with 1926; this, in addition to "lighting oil," much of which is used for fuel purposes. The whole of this oil is entering the field of utility which gas could undoubtedly supply, subject to price.

It is somewhat remarkable that the coal industry, although aware of the grave importance of this problem, has not apparently realized that it is only through the activities of the Gas Industry that this foreign invader can be fought. I suggest to the gentlemen responsible for the price fixing schemes under the Coal Mines Act that they should study this question a little closer. We may perhaps then hear a desire to *decrease* the price of coal to gas undertakings in order that oil competition may be fought, and the demand for coal increased.

2. Gas undertakings which in the past may have been lukewarm so far as the development of an industrial load is concerned will, in the event of an upward tendency in trade, have to decide very quickly whether they are going all out for industrial business on a satisfactory price basis. Many already have loads which are at present affected, and will be far more seriously affected in the future by competitors.

We shall probably always have some industrial business, but surely we do not wish to go back to the time when we accepted whatever business in this direction came to us practically without effort. This would mean that we should have an industrial load confined to specials.

I hope that I have sufficiently analyzed the position to encourage our own Industry to the forefront of supplying fuel to the industries of the country.

There is now no lack of technical information, with results of experimental and practical installations, which may have been used as an argument against such a line of action a few years ago.

COMPETITION.

3. The Gas Industry has passed through the period of being the only source of supply for fuel possessing advantages over solid fuel, and has now and in the future to obtain its business against severe competition. Makers of solid fuel burning furnaces are improving combustion methods and designs of furnaces, leading to extensive economies over their older methods.

Electric furnaces are being installed in many industries, and will find their right place in the general scheme.

We are in a position generally to meet competition from both the above sources, but we are not at present in a position to meet entirely the competition from oil fuel. We are in a much stronger position than we were, say, from two to three years ago. At that time fuel oil had been cheapened by gradual price reductions, and its cheapness forced a large number of manufacturers to adopt it in furnace work, and for many applications for which we were aware it was not suitable. Where it has been used in the latter cases, strenuous endeavours have been made by the makers of apparatus to render it suitable. Some cases have been successful, but we are aware of a large number of installations which have had to be abandoned and reversion made to a gas heating system.

This is particularly noticeable in the case of the lower temperature operations, and is explained by the fact that oil, to be completely burned, has of necessity to generate a very high flame temperature, and it is obvious that this alone is a serious drawback when a temperature of less than 1000° C., or even as low as 200-300° Fahr. is required. In these instances wear and tear on metal parts and refractory materials has been particularly heavy, and thus high maintenance charges, with a cheap fuel have on numerous occasions led the manufacturer to a reconsideration of gas fuel, which, although higher in price, can be burned satisfactorily at any required temperature, and the applications of which is very low in maintenance charges so far as industrial appliances are concerned.

Where, of course, the high-temperature flame generated by the burning of fuel oil is of advantage, as in the case of many forging operations, gas is only able to compete on a direct price basis, unless special care is required so far as the "atmosphere" of the furnace is concerned.

We know that fuel oil is being sold at uneconomic prices in this country to-day. The Gas Industry will have to strain every nerve to meet this competition on a price basis, and providing this is undertaken by every supplying unit faced with heavy competition, it has every right to expect assistance from Government authorities, who must see that the importation of fuel oil from foreign sources of supply is acting against the use of coal, and gas as its derivative—on which the prosperity of this country depends to so large an extent.

It is well known that the whole of the fuel question is receiving special attention by several committees which have been formed to deal with this matter, and it is hoped that new legislative measures will be introduced to assist gas undertakings, and to give greater freedom of action, particularly in the supplying of gas to large consumers where such conditions as load factor, times of use, &c., justify special rates.

From our experience in Birmingham we are satisfied that with gas at 4d. a therm we should be in a position to compete with solid and liquid fuels on an "all-in" cost basis for the *majority* of heat processes requiring varying degrees of refinement similar to those met with in our own area of supply.

From the experience gained with other undertakings, it must be realized that gas prices have to be on an economic basis with the cost of solid fuel available in the particular districts.

It is because coke oven gas has been made available at comparatively low prices which compare economically with coal prices in those particular areas that so many manufacturers have called for supplies, as they have realized fully the advantages of the gas supply.

GAS FOR MOTOR VEHICLES.

In view of the widespread interest which is being taken in the experimental work we are carrying out in Birmingham, I am sure you will expect me to say a few words in regard to the possibilities of what may be termed "portable gas" for the purposes mentioned later.

This work has been undertaken in order to investigate the possibilities of the use of gas in the compressed form for the running of internal combustion engines and also for use in districts remote from gas mains, such as in the case of country houses, farms, &c., where in many instances a supply of gas, which would have to be supplied in a portable manner in bottles or cylinders, would be welcomed for purposes such as domestic heating, lighting, and the heating of incubators.

With regard to the use of bottled gas to replace petrol, while the work which we have been carrying out was dealt with fully in the paper by Dr. Walter, to which I have already referred, I should like to mention that since publication of this information we have progressed a stage further, and by certain modifications to the design of the original air-gas mixers which were used in place of the

petrol carburettors, a further increase in efficiency amounting to 10 p.ct. has been obtained when running on gas alone, without any enrichment with benzole.

It may be remembered that the results of the previous experiments showed that the maximum power output of a standard low compression engine when running on town gas as compared with petrol was about 78 p.ct. of that obtained with petrol. More recently, as a result of further experimental work, this figure has been improved by more than 10 p.ct. and it would appear that by increasing the compression ratio it would be possible to raise the maximum power when running on gas alone almost to that obtainable with petrol. A similar result would, of course, also be possible by enrichment with benzole.

I am also glad to mention that in view of the various safeguards which we shall be employing in connection with bottled gas equipment for vehicles, we have now obtained the authority of the Home Office to run a test vehicle on the road with special steel cylinders containing gas at a pressure of 3000 lbs. per sq. in., and we are immediately extending our tests under practical running conditions.

It is interesting to note that we have already received inquiries for compressed gas for lighting and heating of country houses, garages, and cafés, and also for use on private yachts; and the possibilities in each case are being carefully followed up by our service department.

It will also be appreciated that compressed gas stored in bottles at these very high pressures might be of considerable value to gas undertakings to assist them in carrying peak loads in certain districts at certain times, and also for giving temporary supplies of gas for water boiling at fêtes and garden parties, and similar functions where a supply from the main is unavailable.

A further use might be made with gas stored in cylinders in the carrying out of practical tests on furnaces and other industrial appliances on a prospective consumer's premises, where gas is not available, or is not in a convenient position.

The use of gas in this form is also being carefully investigated for picnics in place of the more cumbersome paraffin or spirit stove ordinarily used for this purpose, and already we have had small cylinders of capacities from 1·9 to 5 c.ft. manufactured, which on test have given extremely satisfactory results.

A number of tests carried out on the boiling of water in the open, show that it is possible to boil a 3-pint kettle with a high-pressure burner supplied from gas in steel bottles in less than three minutes, this being appreciably quicker than when the average type of paraffin or spirit stove is used for the purpose.

The applications referred to above are only representative of a few possible applications which will suggest themselves, but until compressors are available in various districts it will be useless to attempt to develop on any considerable scale some of the domestic uses to which I have referred.

It is gratifying to note that already four compressing installations are being erected in various parts of the country for experimental work, and when the use of town gas as a substitute for petrol has established itself, more particularly for the running of the heavier vehicles such as passenger-carrying 'buses, lorries, and light vans, the field of application of bottled gas will be considerably extended, by reason of the fact that more compressing stations will be available for giving supplies for the many and varied purposes for which this form of fuel is admirably suited.

Discussion.

Mr. E. Crowther (Bradford): This paper adds to the debt which the Gas Industry owes to Birmingham, and to Mr. Smith, not only for the valuable work which has been done in Birmingham, but even more for the readiness with which its benefits have been freely shared with all in the Industry.

Compressed Gas.

It is rarely that any projected development in the use of gas has met with such public interest as is displayed in the proposal to use compressed gas in place of petrol. In several towns compressing plant has already been installed, and I believe that the installation of many more such plants is delayed only for two reasons. First, it is felt that the mere duplication of experiments is superfluous, and, secondly, some of us wish first to get a clearer conception of the ultimate scope of the scheme before we embark upon it. Two alternative lines of action seem to be open—either to seek the more limited but assured and steady loads, such, for example, as that of a fleet of omnibuses operating from a central depôt; or to attempt to replace petrol wherever it is now used for traction purposes. The former alternative appears the easier of achievement, as a large fleet of vehicles would justify the provision at their depôt of a compressor, which, without requiring too large a receiver, could be run at a fair load factor, and enable the vehicles to be supplied without loss of working time. No doubt this type of load would provide a large amount of business, but it is small in comparison with the possibilities of the larger field.

It would be a matter of great difficulty, however, to provide a sufficient number of compressing stations, with adequate receiver capacity, to serve the latter field. At the same time, unless they could rely on obtaining supplies of gas at numerous accessible points, without loss of time, it is obvious that vehicle owners would not go to the expense of the necessary equipment. Is there a possible solution of the difficulty in a modification of the present line of attack, whereby gas cylinders would not be built into their vehicles, but would be small and readily detachable, so that a full cylinder could be substituted for an empty one in a few moments? If this could be done, one compressor station could be occupied at a steady load in refilling empty cylinders returned to it from a number of subsidiary fuel stations, and in this manner it is possible to conceive of the radius of action of a gas-driven vehicle being extended over the whole country.

I should be most interested to have Mr. Smith's views on these points, and I suggest that it is desirable for the Industry as a whole to determine its policy in the matter without delay. When this has been done, no doubt it will be possible to standardize on one working pressure, design of cylinder, pipe coupling, and so forth, so that we may all go out for this business along uniform lines.

Work in Sheffield.

Mr. Brown (Sheffield): The Sheffield Gas Company, like Birmingham, has been alive to the possibilities of the industrial load for many years, and has endeavoured to assist the manufacturers in every way possible, particularly by giving them the benefits of a well-equipped furnace demonstration room for testing out their various heat-treatment operations, and latterly by placing at their service one of the most up-to-date laboratories in the country, under the control of Dr. Fells. These enterprises have amply repaid the expense and trouble involved by considerably increasing our sale of gas furnaces, and, consequently, the gas consumption. Sheffield, being in the heart of the steel industries, is in the happy position of having one of the largest industrial loads in the country, owing to its being able to supply an abundance of cheap gas, with intensive service. Within recent years we have been fortunate in capturing a large amount of business by displacing solid fuel fired furnaces by gas fired furnaces in many of the major heat-treatment operations.

I can fully appreciate Mr. Smith's remarks on the qualifications of the industrial representative and his capacity for dealing with different types of men, particular mention being made of the workman. This last point is of extreme importance, for I myself have found in a great many cases that only by converting the operator, by a practical demonstration of the utility and suitability of gas to do his specific operation, can we gain his confidence. I believe that town gas is the fuel of the future for all heat-treatment operations.

Increased Efficiency of Appliances.

Mr. J. H. Clegg (Burnley): Mr. Smith has emphasized the importance of increased efficiency of the appliances which are provided, and suggests that wherever possible the conversion of existing apparatus should be avoided. With this remark I fully agree, but in many cases it is impossible, because the manufacturer, having equipment which is carrying out its work in a satisfactory manner, can only be induced to use gas by a great deal of persuasion, and is reluctant to lay out a large sum of money. Therefore, the problem before us in the first instance is to try to make existing apparatus do its work by gas. When the manufacturer is told that the efficiency, by adopting this method, will be very low, he explains that he understands all that, but he desires to have experience of gas first of all, and for this reason he does not desire to embark upon a large capital expenditure. In these circumstances it is necessary to convert existing plant, in addition to those applications which have been mentioned in the paper. I may say that we have successfully applied gas to the melting of glass by converting existing coal fired lehrs for that purpose. We have also converted successfully the steam tube type of baker's oven, and in connection with the melting of metals we have carried out certain work, particularly with the melting of aluminium. We have had one particular application before us in which the makers guaranteed that the apparatus would give 43 p.ct. efficiency, and I was very pleased to find that when the furnace was put into operation we reached 49 p.ct. I think that is a very remarkable figure in comparison with anything achieved previously in the melting of aluminium. In addition to that, the percentage metal loss was reduced from 4 to 0·93. The actual gas consumption per lb. of metal melted was 1·671 c.ft.

We have also pushed steam raising by gas. In this connection I suggest to gas engineers that what they wish to sell they should themselves have faith in, and use to the fullest extent in their own work. Following this principle, we have installed a boiler capable of generating 7000 lbs. of steam per hour at 200 lbs. pressure, by gas, and this boiler has been the means of our obtaining many other installations in the town for various purposes.

If gas has been proved to be so efficient and so successful for propulsion, why should it not again be encouraged for use in stationary internal combustion engines?

Mr. H. R. S. Williams (Altrincham): Mr. Smith has stated that from his experience he is satisfied that gas must be supplied at 4d. per therm if we are to be in a position to compete with oil. I should like to ask Mr. Smith whether he is supply-

ing gas at 4d. per therm, and, if so, the quantity he considers is necessary to be consumed before that figure can be offered.

Vote of Thanks.

Mr. Frank H. Jones, proposing a vote of thanks to Mr. Smith, said: I am connected with a Company in France which for two whole years has been running a 10-ton coal lorry on compressed gas, and that sort of experiment has resulted in gas being sent, in cylinders, out into the country villages for certain small industrial purposes, and in one or two cases for cooking in seaside places on the Normandy coast. I would, however, urge the smaller gas undertakings to leave this question of motor transport in the hands in which it is to-day. The Gas Light and Coke Company, the Tottenham Gas Company, and the Birmingham Corporation, I believe, are going into it very thoroughly, and I purposely have left it alone in other Companies with which I am connected, and especially in this French Company, because I felt it was much better to leave somebody who really can go into the thing properly and carefully, and produce a scheme which we can all adopt, to carry on this work, so that we may be able to use gas for motor cars satisfactorily all over the country.

Mr. T. P. Ridley (Newcastle-on-Tyne) seconded the vote of thanks.

The Author's Reply.

Mr. Smith, replying to the discussion, said: With regard to the question of compressed gas, I do want to ask you to be patient a little longer. I have never known any subject in the Gas Industry arouse such immense interest as has this question of compressed gas for motor vehicles. We have had letters from all over the world about it since publicity has been given to it. But it would be disastrous to start a thing of this kind unless it was foolproof, unless we were assured that no accidents could happen. The present position is that we are really waiting for the final development in regard to some of the minor matters.

We had one letter from Copenhagen which stated that, although they have not been using compressed gas for traction purposes there, they have for a long time been supplying compressed gas at fairly low pressures to outlying districts where otherwise there would be no gas supply. Therefore, the more you think about it the more it appeals to the imagination, because we are going to make gas, we hope, more mobile.

The other question, as to what our policy is to be, resolves itself into one of awaiting developments. We must walk before we can run, and the obvious first experiment is with a 'bus company which has a definite circuit, and not on long distance 'buses, although these latter, I hope, in time, with an increase in the number of filling stations and developments with regard to the size of cylinder, &c., will ultimately adopt compressed gas. Certainly so far as we have gone it is very promising indeed, and I have every hope that, with a little assistance from the Government, something may be done. Here, however, we have to remember the influence that is being brought to bear on the Government to reduce very substantially the duty on petrol, owing to the increase in the price of petrol, and we have also to bear in mind the Salter Report, which throws out the possibility of heavier license duties on vehicles which do not use petrol. These are the handicaps with which we shall have to contend in the development of a home produced fuel, and they are matters which the Government will undoubtedly have very much in mind when they decide on their policy.

I was glad that Mr. Brown, of Sheffield, took part in the discussion. We are really very modest in Birmingham, and are being pushed into the limelight in this matter, not from any desire of our own, but because other people will not come forward and say what they are doing. We know that Sheffield is doing a great deal of work in this connection, and we want those in Sheffield, if they will, to come out and tell us exactly what they are doing. I believe that in Sheffield they are carrying out experiments on a problem which is puzzling our people very much, and which they have in the forefront of their minds—namely, the question of the effect of the moisture content of the products of combustion on steel. It is such little snags which have to be dealt with, and I believe the workers in Sheffield have had particular experience in this particular matter. I do not know if Dr. Fells has any information on research on these lines, but if he has it would be of considerable help to the whole Industry if it could be disseminated, so that all of us could adopt one common line of action.

Mention has been made of steam raising by gas, and the question of price has been brought up. As a matter of fact, I should like to ask Mr. Clegg what he is charging for gas for steam raising, and how that price compares with the general rates. Perhaps that is a question we had better not embark on in this discussion, but with regard to the 4d. per therm mentioned in the paper, this is a figure rather indicative of what can be done where these heating operations have to be dealt with. In Birmingham we have little of the heavy forging type of work, but we have a great deal of the other type of heating operations—carburizing, &c.—and we have found, after very careful evaluation, that if we could sell our gas at 4d. per therm we could practically eliminate oil competition. In this connection I maintain that we ought to be assisted by the coal industry. It has been frankly stated that the endeavour is to make public utilities pay more for their coal because they can afford to do it, but the fact is that public utilities cannot afford to pay more for their coal, and the sooner the coal industry alters its mentality in this way and realizes that we are its First Lieutenants in this matter, the better it will be for both that industry and ourselves, because by keeping the price of coal within reasonable limits the coal industry is enabling us to help it to fight the competition of oil fuel. We are selling gas at 4d. per therm in one or two cases under special load conditions, and in that way have been successful in turning out other forms of fuel. I want to be in the position to sell more gas at that figure, but unfortunately we in Birmingham are not situated as they are in Sheffield, Rotherham, and other places on the coalfield. We are a long way from our gas-coal fields and have heavy railway rates to pay; moreover, we have no coke oven gas to pipe into our works to enable us to reduce our prices.

Ascending a Gasholder

A Unique View of the 320-ft. Lift Shaft of the Waterless Holder of the Gas Light and Coke Company at Battersea.

Development of the Sale of Gas for Industrial Purposes

By Col. W. M. CARR, T.D.,

Engineer, General Manager, and Clerk to the Stretford and District Gas Board.

A cheap and abundant supply of gas for industry is of national importance, particularly in Great Britain where coal is the principal natural mineral wealth.

It is no exaggeration, therefore, to state that the Gas Industry has one of the most important parts to play in bringing about a revival in the basic industries of the country by making available a supply of heat derived from coal, such as can be readily used, and controlled to conform with scientific methods of manufacture and production.

The use of coal in its raw state is not only unscientific, but uneconomic; it is not in conformity with modern practice in our factories, and the manufacturer to-day is looking for a fuel of constant quality that can be accurately and scientifically controlled.

It is the prerogative of the Gas Industry to supply this need, and it is perhaps unfortunate that, since its inception, it should have been concerned principally with the supply of gas for domestic purposes, as in the mind of the general public, and, even, in the minds of many responsible for the conduct of Gas Undertakings, this is to-day looked upon as its sole function.

This attitude of mind within and without our Industry, combined with the restrictions of obsolete legislation affecting the charges for gas, has retarded the development of the use of gas in industry, which has perforce, in many instances, turned to imported fuel oil as being more portable, more easily controlled, and requiring less labour than raw coal.

The development of the internal combustion engine for road transport has further resulted in the displacing of large quantities of coal once utilized on the railways, but recent developments show that there is not only a possibility, but a probability, of recovering this business in terms of coal by the use of compressed town gas in storage cylinders.

It requires no great imagination to envisage the potential field for gas as the principal heating agent in this country; it remains for our Industry to open up the field by constant effort to improve the efficiency of utilization in industrial processes, and by affording a supply at an economic price.

In putting forward the following suggestions as to the organization that it is necessary to set up in order to build up and develop the industrial load, the writer is conscious of the magnitude of the work, and they should be taken therefore as indicating that which should be done in the commencement rather than in the later stages of development.

ORGANIZATION WITHIN THE GAS UNDERTAKING.

Staffing an Industrial Department.

The provision of staff scientifically trained, not only in the use of gas, but in modern factory practice, is the first requirement in all but the smallest undertakings. Education of the personnel should include a Course in Fuel Technology, General Engineering, and Gas Supply, and subsequent training should include experience in modern factories and workshops.

The workshop experience may be arranged for by the Gas Undertakings, as manufacturers are often prepared to take juniors for workshop experience for limited periods of employment. Subsequent training follows in the making of industrial surveys in manufacturers' works, and the recording of results and efficiencies with the various fuels that may be in use, and, finally, in the building up of schemes for gas installations on a competitive basis with other fuels.

The commercial aspect must be kept to the fore throughout the whole of the training, and a knowledge of accounts, and of the building up of factory costs as affected by costs of labour, material, and fuel, together with on-cost and standing charges, is essential. The object of the training is so to equip the technical gas salesman that he is enabled to talk to the manufacturer with confidence on his own ground.

In dealing with the question of personnel it is further essential that the chief technical official of a gas undertaking should keep himself abreast with developments as affecting the industries in his area, and also with development in the usage of gas and so enable himself to initiate and supervise the work of the industrial staff.

The work of gas development cannot be left solely to an industrial department. The closest *liaison* is necessary with the undertaking's chemical staff for the carrying out of analyses of furnace gases, materials, &c., with the engineering staff for the design and development of appliances to meet manufacturers' particular requirements; with the mains staff for the purpose of availability of supplies, &c., and, finally, with the general management who will eventually negotiate the cost and conditions of supply.

The number required for the staffing of the industrial service and sales department of an undertaking depends upon the size of the undertaking, and the nature of the area supplied.

In the case of an undertaking to-day selling, say, 750 to 1000 million c.ft. of gas per annum, and serving an area with a variety of industries, at least two, and possibly three, trained technical officers may be efficiently and effectively employed in the service and development of industrial gas supply with, as previously indicated, the assistance of the existing management and technical staff.

Demonstration Showroom and Laboratory.

A demonstration showroom for furnaces and appliances is by no means a necessity, although in the largest undertakings it may prove of assistance, particularly where a manufacturer desires a demonstration of the suitability of gas for his particular process. In the majority of cases, however, the manufacturer admits the suitability, but concerns himself principally with the efficiency of utilization.

While the establishment of an industrial research laboratory is only possible in the largest undertakings, there is a vast amount of experimental and investigation work to be done, and it is suggested, therefore, that this work, which is dealt with later in this paper, is of such importance that it is essential it should be organized on a national basis.

Conduct of an Industrial Department Survey.

An industrial service and selling staff having been set up, a definite plan of development is essential, and should commence with a survey to ascertain the potentialities of the area.

The conduct of such a survey in an intense industrial area may occupy a number of years. The survey should be directed, not only to existing gas consumers, but to all factories where fuel is used no matter in what form or on how large or small a scale. Where heat is used, there is always a potential use for gas.

Manufacturers are not always willing, on first approach, to give information or afford facilities to the gas undertakers for the investigation of their heating processes. In the writer's experience, however, the manufacturer who has not been so willing is the exception; in the majority of cases, he is anxious, where possible, to consider any proposals which may eventually lead to increased efficiency and economy in production.

In instances where direct contact for the purpose of carrying out the survey cannot be established, a record should be made of all known information as to the processes and methods of the particular works.

In conducting a survey with the manufacturers' consent, the heads of investigation should include:

(*a*) General description of the class of work carried out.

(*b*) The processes of manufacture in operation.

(*c*) Description of all plant using fuel whether it be steam raising, heating, metal melting, or heat treatment in any form. This information should be carefully subdivided with an accurate description, including dimensions of the plant in use and the labour, storage, &c., employed in connection with heating processes. Where possible, the quantities of fuel consumed and costs should be included, also notes as to general efficiency so far as can be ascertained without experimental investigation.

(*d*) Information should further be recorded as to the class of manufactured article resulting from the various heating processes, particularly with a view to determining ultimately if it could be improved by the utilization of better heating conditions following upon the use of gas.

(*e*) The methods of handling and the general labour employed should also be recorded with a view to ascertaining the saving in the handling of materials, and improved workshop practice, which may be incidental to the introduction of gaseous heating.

Investigation Following a Survey.

Careful consideration of the completed survey will indicate the processes to which gaseous fuel can be most efficiently applied, and which it is desirable should be further investigated with a view to ascertaining detailed efficiencies and costs under existing methods.

The number of possible applications for gas in directions previously not considered which have resulted from careful survey has been remarkable in recent experience.

The further investigation, following upon the selection of a particular process as being likely to show increased efficiency and economies with gaseous firing, should be most carefully carried out, and involves the consideration, not only of the particular heating process, but of the treatment of the manufactured article from its inception; for example, the melting of metals and alloys requires investigation as to the constituents and nature of the metal, and the condition in which it is required to be after treatment, the effect of the heating process upon the nature of the metal, losses in treatment, and the labour utilized in the process.

A difficulty frequently experienced in labour considerations is the oft-repeated story of the manufacturer that no labour can be saved as a man is only utilized for an hour or two in attending to a particular furnace, and he is required in connection with the other parts of the process. This fallacious argument is usually capable of circumvention as a part saving of time is of value even in the smallest factory. A further difficulty is sometimes met in a manufacturer's proposal that his existing furnace designed for solid fuel or oil should be converted to gaseous firing, and it is only in very rare instances that such conversion is possible without serious loss in efficiency.

In this respect, the history of the development of domestic supply repeats itself; in the early days of gas fires it was common practice to convert a coal fire to gaseous firing by inserting a burner and filling the space normally occupied by the coal with ball "fuel." This practice has long been discontinued on account of inefficiency.

In some instances, it is possible to find a standard type of furnace to suit a particular job; in many others, however, it is necessary to design the furnace to suit the job. When so doing, particular attention should be given to the handling of materials, to the working conditions for the men, and also to determining what additional economies can be obtained as a result of improved workshop conditions.

It is desirable, when submitting a proposal for gaseous heating, that, wherever possible, the efficiency should be stated in terms of cost per unit manufactured or treated, including not only fuel, but incidental labour and other costs. The cost of gas per therm has little significance to the average manufacturer; the cost of a process per unit or weight treated is, with him, an every day consideration.

Anticipated efficiencies should be under-stated rather than over-stated in order to allow for the normal variation in working conditions, and for the human element. In respect of the latter, the importance of simplified (and, as far as possible, automatic) control of furnaces cannot be over-stressed, particularly when dealing with a valuable high-grade, clean fuel such as town gas.

The wasteful and inefficient usage of gas in industrial processes has more than anything else prevented the expansion of its use in many factories.

Installation and Tests.

The gas undertaking should endeavour, where possible, to supervise an installation from its inception, and the tests of the furnaces under working conditions should be carried out in an exhaustive and scientific manner so that it is definitely assured that the furnace can, and will, be maintained to give the maximum efficiency.

It is scarcely necessary to call attention to the importance of records. The system followed by the writer is separately to record surveys, descriptions of appliances, information as to working results, and results of tests carried out with solid fuels and with gaseous firing, for each factory or works in the area. These records are cross-referenced, and the work done in one factory has proved to be invaluable in obtaining business in another; though, in this connection, care has been taken that no information other than that directly appertaining to the usage of gas is passed to competitive firms.

Supply of Industrial Appliances.

Comparatively few gas undertakings concern themselves with the supply of furnaces and industrial appliances, and, in consequence, are unable to maintain the same contact with the industrial user as with the domestic user who has been taught to look to the gas supplier for the supply of his requirements.

The manufacturer acquires confidence where the gas undertaking is prepared not only to supply his industrial appliances, but to guarantee their performance and maintenance.

The writer instances as an example the case of a large firm of cable manufacturers who have sent all their heat inquiries, and purchased all their gas furnaces, through the gas undertaking, with one exception—the conversion of a large bright annealing furnace for which the gas undertaking invited tenders. The order for this furnace was placed direct with the furnace maker on the design and tender as recommended by the gas undertaking.

The confidence of the manufacturer cannot be obtained and held if our service ends at the outlet of the gas meter in his works, and it must, therefore, extend to his appliances.

In Stretford, industrial appliances have been sold on hire-purchase terms spread over two years to small manufacturers who could not afford to lay down the initial capital in one payment. In one instance, an installation of lead-melting furnaces with special elevating gear for the purpose of raising the lead pots, and running into moulds after melting, was supplied on hire purchase over two years, the total cost of the installation being, approximately, £480. The furnaces were purchased from furnace makers, and the special elevating gear manufactured in the gas undertaking's worshops. This business could not have been secured for gas except on hire-purchase terms. Installations of drying ovens and varnish pots have also been put in recently on hire-purchase terms.

Charges for Gas.

The writer has made an attempt to indicate in general terms the organization that is desirable within the gas undertaking in order to develop and maintain the sales of gas to industry, and to show that the need for service is as great as in the domestic field, if, indeed, not greater.

If, however, business is to be obtained, it is of the utmost importance that gas for industrial purposes should be sold at an economic rate.

Many company undertakings, operating under a statutory sliding scale for the regulation of dividends, have been precluded thereby from the setting up of special rates or entering into special contracts for industrial supplies. This, however, does not apply to municipal undertakings, many of whom are free to introduce optional two, three, or four part tariffs, and block systems of charge, and, alternatively, to enter into special contracts for the supply of gas to industry.

In this matter of price, the question arises as to what is an economic charge? It may be fairly stated that it is obviously wrong to base charges for industrial supplies on the average cost of supplying the domestic load.

The following are the factors of average cost which are common to all charges:

(1) Net cost of coal—that is to say, coal less receipts from residuals.

(2) Purification.

(3) Repairs of plant.

In respect of the third item, it may be claimed in works where there is a considerable amount of surplus plant that the average figure for repairs of plant may be partially discounted in considering charges of net cost which must be recovered in the selling price.

The appended analysis of the cost of manufacture of gas in the Stretford Gas Undertaking for the year ended March 31, 1932, shows that the net cost of coal per therm was 1·10d. and purification 0·07d. per therm, and these items must of necessity be covered in any charge.

The total cost of manufacture, exclusive of capital charges, was 2·40d. per therm, and inclusive of rents, rates, and capital charges on works and gasholders, 3·31d. per therm. The latter figure is rather higher than is normal on account of the large amount of surplus plant available, the carbonizing plant being 100 p.ct. above present maximum requirements. In building up a scale of charge for a large supply this figure can be considerably discounted.

The following is the estimated cost of supplying an annual load of 90 million c.ft. to one works, with a constant hourly demand for seven days per week (156 hours)

which is at present considering the utilization of gas on large scale processes:

	Pence per Therm.
Net cost of coal for the year ended March 31, 1932	1·10
Purification	0·07
Salaries (one-fifth of average cost for last financial year).	0·03
Wages at works (representing wages cost of any additional production beyond present demand)	0·20
Repairs and maintenance of plant (half of existing average cost per therm as excess plant is at present maintained)	0·34
Rents, rates, and capital charges (proportion after allowing for present excess plant available upon which charges are being paid)	0·45
Interest, sinking fund, and maintenance charges on cost of main from gas-works to manufacturers' works to meet maximum demand on annual consumption of 90 million c ft.	0·14
	2·33

From the foregoing figures it is seen that in this instance a very low price of 2½d. per therm would yield a profit of 7 p.ct. to the gas undertaking after meeting costs. The general administration and accountancy charges are so small on a supply of this dimension that they can be safely left out of the calculation.

The charges on distribution and appliances incidental to a supply of a domestic load should not be taken into account, nor should overhead management charges, such as collectors, accountancy, &c.; the cost, however, should bear something of the standing charges for technical and industrial sales staff.

It is certain that if the industrial rate includes costs which are incurred with other classes of consumer it will normally be too high to meet competition in the form of solid fuel or oil. A flat rate system, which is based on the average cost of supply in a gas undertaking, denies to the industrial consumer the advantage which is justly his on account of quantity taken, and distribution of load, and will effectually prevent the development of sales to the disadvantage of the Industry.

A two-part tariff for industrial gas was instituted at Stretford in the year 1927, and for the purpose of arriving at this charge, an analysis of the accounts for the previous year was made on a four-part basis, generally on the lines of the principle of rate structure as described in the Appendix of the Report of the Committee of the National Gas Council on Gas Charges, the charges being divided up under four heads, as follows:

(1) Standing charges consequent upon the manufacturing or production plant—*i.e.*, interest and sinking fund on the production plant, taxes and insurance, and fixed management salaries, called the production demand.
(2) Standing charges consequent upon distribution—*i.e.*, interest and sinking fund on mains, taxes, and insurance, and fixed salaries on distribution.
(3) All expenses which vary directly with the number of consumers, such as meter reading, keeping of accounts, repairs and maintenance of meters, cookers, and service pipes, and the interest and sinking fund on meters and appliances supplied to consumers.
(4) The actual cost of the manufacture of gas.

The two-part charge was eventually based on the analysis of the four-part tariff, which clearly demonstrated that the large industrial consumer was charged too much for gas under the flat rate notwithstanding the allowance of discount having regard to the incidence of the customer charge.

A graph of the hourly loads over a period of several weeks showed that the peak demand for gas falls within the period of 7 a.m. to 7 p.m., so that any load outside this period, off the peak demand, does not require to meet storage and distribution demand charges, having regard to the state of the demand in the whole area. It was therefore decided to base the industrial two-part charge on a 12-hour maximum demand basis. The effect of this is to give gas to the industrial consumer taking a supply continuously over 24 hours at a lower rate than can be given to a consumer taking gas at a time when the load is superimposed on the peak demands; that is to say, the consumer is given the advantage of the use made of the mains when they are not fully occupied, also of the equivalent saving in storage and the balancing of the amount of production plant in use.

It is true that the maximum 12-hour demand of individual consumers does not synchronize with the maximum 12-hour demand on the whole undertaking. If, however, the maximum 12-hour demands of all individual consumers were added together, the total would amount to a substantially greater figure than the maximum 12-hour output of the whole undertaking. Therefore a demand charge based on the maximum demand on the whole undertaking allows, with this diversity factor, a very safe margin in operation.

It was found that the industrial consumer was reluctant, owing to the possibility of adverse trade conditions, to agree to a demand charge assessed on an annual basis. It was, however, considered reasonably safe to assess the demand charge on a quarterly basis on account of the margin allowed by the diversity factor previously referred to, which was not taken into account in fixing the amount on the demand charge. The following is the two-part charge which is now in operation:

QUARTERLY DEMAND CHARGE.

Based on the maximum 12-hourly demand in the quarter.

	Per Therm. £ s. d.
For the first 10 therms of 12-hour demand	1 5 0
,, next 40 ,, ,, ,,	1 2 6
,, ,, 100 ,, ,, ,,	1 0 0
,, ,, 150 ,, ,, ,,	0 17 6
,, ,, 200 ,, ,, ,,	0 15 0
For all above 500 ,,	0 12 6

COMMODITY CHARGE.

	Per Therm.
For the first 500 therms per month	3 d.
,, next 4,500 ,, ,,	2¾d.
,, ,, 15,000 ,, ,,	2½d.
,, ,, 30,000 ,, ,,	2¼d.
For all above 50,000 ,, ,,	2 d.

The above prices are subject to a discount of ½d. per therm for payment within 28 days.

The scale both for demand charge and commodity charge is a graduated one built up on the block system, and the reductions only apply to the section in which the consumption occurs, and not to the whole consumption.

The demand charge which covers the production demand, and the distribution demand, is based upon the maximum demand upon the whole undertaking, and as the two-part charge has only so far been applied to industrial consumers, the customer charge, on the four-part analysis of the accounts, which amounted to £2 5s. 8d. per consumer per annum, or thereabouts, was omitted from consideration as it is considered that the margin in the demand charge is sufficient to cover it.

The two-part charge has proved inequitable in certain instances; for example, in the case of a biscuit factory employed in the manufacture of ice cream wafers, there is a high maximum demand in the summer months, and a very low maximum demand in the winter, and, in these circumstances, the all-in charge is inordinately high in relation to the cost of supplying. This difficulty has been overcome by making a special contract with a fixed minimum annual charge to meet standing charges, and a commodity charge on a similar basis to a two-part charge.

A number of gas undertakings have, with advantage, introduced special rates for a special usage where such usage provides a demand which can be assessed within reasonable limits, and again there is much to be said in favour of an extended block system of charge coming down to very low rates for large quantities where the demand is distributed, and not superimposed upon the peak loads of the undertaking.

If gas is to be supplied to meet large fluctuating demands, as, for example, in steelworks' practice, it is necessary that storage should be installed at the point of user, thus enabling the gas undertaking to pass on to the consumer the saving in storage cost, and the substantially lower distribution cost on account of the saving in mains.

The revision of the methods of charge for industrial purposes throughout the whole Industry is a matter of the greatest urgency, and if the Industry continues to include in its price to the industrial user charges directly incidental to the supply of gas to domestic users, the industrialists will continue to extend the use of crude oil with consequent disadvantage to the nation, and money which should be employed in the utilization of British labour, and the purchase of our national raw product, will, for the greater part, be expended abroad.

The central-heating load for large buildings, works, and offices may be considered as coming within the ambit of industrial supplies. The demand is one which assists in increasing the load factor, and it can be supplied at a low rate.

The sliding-scale recently introduced by the City of Leeds Gas Department for gas supplied for central heating, in which the price scale extends from 5·11d. per therm for small loads to 2·98d. per therm for large loads, is an excellent example of equitable charging for this class of load.

NATIONAL ORGANIZATION.

Reference has been made to the work that is carried out in the industrial research laboratories of large gas undertakings, notable examples being those at Birmingham and Watson House, and the author would like to bear testimony to the valuable assistance that is rendered by these

and other large undertakings with highly trained personnel to smaller undertakings and the Industry generally.

Unfortunately, there has been no determined attempt on the part of the Gas Industry as a whole to develop practical research in the all-important field of the utilization of gas in manufacturing processes, nor has any serious attempt been made to co-ordinate the work done by individual undertakings. We are dependent, to a great extent, upon the general information which is disseminated by the Technical Press, and we are almost daily searching indiscriminately for information as to applications and efficiencies by inquiry from our fellow officials.

The author has, on several occasions, put forward the suggestion that a national organization should be set up under the ægis of the existing Technical Research Organization of the Institution of Gas Engineers. The technical staff of the Industrial Utilization Branch would, it is suggested, consist of skilled fuel technologists and metallurgists, together with experts in modern factory practice and industrial heating.

In addition to general investigation and research directed to increasing efficiencies in gaseous heating processes such as steel manufacture, foundry practice, metal melting, heat treatment, and applications in special industrial processes, the national technical staff could be utilized for the co-ordination of work done by individual undertakings, and for the recording and presentation of information as to progress and results.

The proposal of the Joint Committee on Large Scale Gas Supplies that the District Committees of the National Gas Council should endeavour to persuade a large undertaking within each district to set up an Industrial Centre for the assistance of other undertakings in the demonstration of furnaces and sales organization is indeterminate and unsatisfactory in that it does not fix a definite responsibility for communal service.

The desirability of building up local centres based on those already well established in large undertakings cannot be questioned as in this way progress can be considerably accelerated. It is suggested, however, that in addition, an independent district organization is necessary if the service is to be made available to all gas undertakings.

The District Centres, working in conjunction with the laboratories, should be such as will enable the gas undertakings to provide their industrial consumers with the most expert advice in gaseous heating, after investigating the problem in consultation with the consumer.

The memorandum issued by the committee refers, under the heading of " Difficulties to be Overcome," to the present day lack of personnel possessing the necessary specialized experience, and to the time required adequately to train a sufficient staff and enable them to obtain the necessary experience. This difficulty is, however, more apparent than real, as there are available in numbers men educated and trained in fuel technology, with considerable experience in industrial heating, who would welcome the opportunity of tendering their services for this work.

The author's experience is that manufacturers welcome the offer of skilled assistance and advice in connection with heating problems, and a move by our Industry to assist manufacturers on a national basis will undoubtedly act as a great stimulant to the development of the use of gas in industry.

Analysis of Cost of Manufacture.

STRETFORD AND DISTRICT GAS BOARD.

Analysis of cost of manufacture of gas per 1000 c.ft. and per therm for the year ended March 31, 1932.

—	£	Pence per 1000 C.Ft.	Pence per Therm.
Coal, gas oil, and coke used in manufacture and on works, &c., including handling charges, also water, electricity, &c., used in manufacture	43,362	15·59	3·12
Less net receipts from residuals after deducting loss on ammonia	28,153	10·12	2·02
Net cost of coal inclusive of sundry materials, water, and electricity	15,209	5·47	1·10
Purification	946	0·33	0·07
Salaries	1,948	0·70	0·14
Wages, inclusive of National Health and Unemployment Insurance	5,778	2·08	0·41
Repairs and maintenance of plant, inclusive of gasholders	9,476	3·41	0·68
	33,357	11·99	2·40
Rents, rates, capital charges (interest and sinking fund) in respect of works and gasholders	12,602	4·53	0·91
Cost of manufacture, inclusive of all charges	45,959	16·52	3·31

Gas sold (1000 c.ft)., 667,480; gas sold (therms), 3,337,402.

Discussion.

Mr. C. R. INGHAM (Brighouse): I should like first of all to congratulate the author on his excellent paper. Col. Carr is a pioneer in methods of gas charging, and I hope that this meeting of the B.C.G.A. will result in further action being taken on the subject of gas charges.

First, with regard to the charges for gas for industrial purposes, it is no use attempting to sell gas for these purposes at a domestic price. First-class salesmen will go a long way, but there is a point at which salesmanship cannot conquer the difficulty of price. It is necessary for us to take action on this point; we cannot go on like this, with the oil industry taking all the business which ought to be ours. In Brighouse we have introduced a four-part tariff for gas sold for industrial purposes. The charges which I will mention are annual charges. There is a customer charge of 15s. 6d. and an hourly demand charge based on 100 c.ft. of maximum hourly demand. There is a 31s. daily demand charge per 100 c.ft. of maximum daily demand. There is a 9s. commodity charge and a charge of 4d. per therm. All these charges are subject to a discount of 10 p.ct. The steps we took in arriving at these charges were, first, that we analyzed our costs in the manner indicated in the Report on Gas Charges published by the National Gas Council. We then examined our industrial sales to find out the maximum individual and maximum coincident loads. The way in which we found out the maximum coincident load was to classify our industrial consumers. For example, all power consumers were classified together—silk manufacturers, wire manufacturers, and so on—and by doing that we found that we had certain maximum demands for each trade and it was possible to take the circumstances of these trades and arrive at something near the actual coincident maximum demand. We decided that the costs, such as manufacturing and demand costs, should be split up between the domestic and the industrial consumers in the proportion that the coincident maximum load bore to the total. Then that quotient was divided by the aggregate individual demands. The effect of that is to introduce a diversity factor, which actually in our case is about 2. I should mention that we interpret " industrial load " very widely. It means " non-domestic," and we include street lighting, fish-frying, and all that sort of thing under the heading of " industrial." The scheme was introduced in 1929, and in the first year we had a 10 p.ct. increase in sales to those consumers who adopted this tariff. Unfortunately, trade being so very bad, our sales have gone down. I am glad to say, however, that they are going up again; not only that, but we are having a chance with any business that is coming along. Our average price works out, for a fairly good industrial consumer, at about 4d. per therm, and at that price we are having a definite chance of business which a few years ago we should not even have known about.

There is another class of charging which is worth considering, and that is by the special purpose rate. An industrial consumer on a scientific tariff should bear all the fixed charges in addition to the commodity charges which he ought to bear, but if we can obtain business which may be profitable to us, and which cannot be obtained if it has to bear the full brunt of the fixed charges, are we to obtain that business or not? That is a question we shall have to consider. We have introduced a special rate for power, because power is one of the best loads we can possibly have. In most towns there are a number of suction gas plants, where the gas pipes and meter are already installed, and all we want is to introduce a sufficiently low rate to get the business. Our own price for this purpose is 2·4d. per therm. I know that is a very low price indeed, but our power business to-day is five times what it was three years ago, and only one new gas engine has gone in; but we have been replacing the suction gas plants. We are also getting a number of petrol engines converted, with great satisfaction to the consumers.

CHEAP GAS FOR THE HOME.

Lastly, I want to call attention to the domestic load. It is the biggest, the most important and the most stable of any, and if you can sell gas to industry at 4d. per therm you should be able to sell it, under certain conditions as to quantity, to domestic consumers at the same cheap rate. I have two proposals before my Committee now. One is to reduce the various charges on our four-part tariff, and another is to introduce a block rate for the domestic consumer. Any consumer taking more than 3000 c.ft. per quarter will obtain gas at 4d. per therm. With a price like that we can do business, but if we maintain the price as at present, at 8d. per therm, or something of that order, we shall never get the business we ought to get.

Therefore, I hope the coming-of-age of this Association will be celebrated by the Gas Industry taking action in this matter of gas charges.

SAFEGUARDING THE SMALL CONSUMER.

Mr. R. WILLACY (Stockport): Early in the paper Col. Carr emphasizes the necessity for having apparently a relatively costly staff, in the interests of his industrial load, and yet, later in the paper, in arriving at the figures for a particular quotation, he only estimates to recover salaries on the basis of one-fifth. Again, he mentions carbonizing plant, and it appears that a large proportion of the cost falls on the small consumer, whereas surely the potential industrial load has only to justify that 100 p.ct. which he mentions. An explanation of other items of a similar character could be asked for, but these will suffice to draw attention to a variation from the report of the Committee on Gas Charges. Such instances justify the necessity for the Government to safeguard the small consumer when considering new legislation. We declare that we are supplying the small

consumer at a loss, yet our basis for determining that loss varies with each undertaking. Under the 1920 Act, Section 15, the Board of Trade has power to determine the form of our accounts. Therefore, I ask the question, would it not be better for us voluntarily to adopt the report of the National Gas Charges Committee—either to adopt it as it is or to amend it and adopt it in the amended form—and then the Board of Trade would know where we stand when it comes to consider our applications for modifications and power to modify and vary our charges for gas? At the present moment I am quite satisfied that the Board of Trade does not trust us, simply because we are saying that we are losing money on a particular type of supply, and yet we do not know how we are dissecting our costs in making that statement.

Industrial Staff.

Dr. H. A. Fells (Chief of Fuel Research Department, Sheffield Gas Company): The best manner of organizing ourselves, individually and collectively, is of paramount importance. A comprehensive method of establishing intimate contact with the rest of the industrial concerns in the country has been described, and details of organizing our industrial departments and research departments have been submitted. I venture to suggest, however, that certain details of these proposals are worthy of more consideration. The first of these, and probably the most important, concerns the staffing of an industrial department. I will quote the qualifications suggested as being suitable for an efficient gas salesman for industrial purposes. "Education of the personnel should include a course in fuel technology, general engineering, and gas supply, and subsequent training should include experience in modern factories and workshops. The commercial aspect must be kept to the fore throughout the whole of the training, and a knowledge of accounts, of the building-up of factory costs as affected by costs of labour, materials and fuel, together with on-costs and standing charges, is essential."

Such qualifications, without doubt, would be those of a super gas salesman. Any manager would be proud to have such a man in his employ, but, unfortunately, such men belong to the ideal and not the everyday practical world. No doubt there are such men, or such men may be trained in time, but it is very doubtful if in anything like adequate numbers. Therefore, I would venture to make a few suggestions, in the hope that they may prove to be useful.

For the many smaller undertakings the men most likely to be suitable are men of proved practical experience in gas fitting as applied to industrial heating processes of as many types as possible. In larger undertakings the industrial department should be similarly constituted, but an industrial research department should be established in addition, staffed by men of suitable scientific attainment, such as fuel technologists, chemists, and metallurgists. The industrial research department should be at the service of the industrial department and of any other department in the undertaking, and also at the service of all customers and potential customers in the district. These industrial research departments should, further, be at the service of the smaller gas undertakings, who naturally could not afford the cost of a staff of highly-trained technical men. The staffs of the research departments should be capable of putting to immediate practical use the wealth of scientific data already available. The existing information brought to light by research workers in our universities is tremendous, but, unfortunately, those same workers are not usually capable of interpreting scientific results into sound practical method. It is merely due to lack of practical everyday experience, just as the workshop man or fitter cannot bring scientific knowledge to bear on his work. The scientific research man needs to be brought out of the clouds down to mundane earth, and the fitter of experience needs to have his many rule-of-thumb methods, mostly quite sound, scientifically adjusted and explained. It is only by using together men of suitable practical experience and men of proved scientific ability that any true and lasting progress is likely to be made in the industrial use of gas. May I quote from the Fifth Annual Report of the Committee on Industrial Gas Research of the American Gas Association:

> "Successful industrial gas research and development work involves to a very large extent a thorough knowledge of the processes of industry. These processes vary, and the trades in which they are used have each developed from different beginnings and under different conditions. To be able to start a project with the hope of successfully conducting it within a reasonable time and at a reasonable cost requires that advantage be taken of all that has gone before in that particular trade.
>
> "It is necessary to draw upon the skill of many specialists, metallurgists, chemists, food experts, combustion engineers, foundrymen, air-conditioning experts, and many others; as well as to have available many kinds of laboratory equipment, workshop facilities, and full-size production plant facilities for test and field work."

Value of Demonstration Rooms.

In conclusion, I should like to make reference to the great value we have found in our demonstration furnace rooms at the Sheffield Gas Company. They have been the means of greatly increasing our sales of industrial gas. We have found that the best way by far to convince a manufacturer, in Sheffield at any rate, of the value of gas for his heat-treatment processes is to *show him*, and not merely to *tell him*. He can bring his work to the furnace room, do it himself in a furnace we propose as suitable for the job, and carry out any necessary tests of the value of his particular article on apparatus installed for the purpose. Time after time it has been only by such practical demonstrations that a new industrial load has been created. As an indication of the value of the combined efforts of practically-trained men of long experience in the fitting of industrial heating plants, and men of scientific ability, along with a well-equipped demonstration furnace room, an entirely new method for the heat-treatment of steels and alloys has been brought out at Sheffield in the last twelve months. During that time we have been concerned with the sale of gas particularly for the heat-treatment of steel. We all know quite well that the makers of furnaces have advertised gas furnaces now for years as being capable of heating steel without scale; a few of them say they can heat steel with a minimum of scale, but I have yet to see a gas-fired furnace—or I had not seen one until a few months ago—that will heat steel without forming scale. However, we have been confining our attention for the last few months to a method of heating steel by means of gas, by which we can honestly say that steel can be heated without any scale and without any decarburization. That is merely an attempt to put to practical use information which has been known for years. It has been known in the Universities for a long time what causes scale on steel and what causes the decarburization of steel, but the men who knew the scientific reasons—the research men in the universities—have not the practical experience of operating furnaces and putting their ideas into actual practice. When I went to the Sheffield Gas Company we were in the fortunate position of having a well-trained practical man who had had years of experience in the installation of heating processes of different types of work. I was one of those research men who knew nothing about the practical methods, so we worked together; and we have developed this process. The result is that, without any doubt whatever, we can now heat steel to a temperature as high as 1350° C. without a trace of scale, and we can guarantee also no decarburization. As a matter of fact, this has only been demonstrated to the trade during the last fortnight. We have only demonstrated it to four different firms, and one of these firms actually sent in a report to Mr. Halkett, our General Manager, stating that in all their experience of the manufacture of twist drills they have never been able to make a drill to compare with those made in our demonstration room.

That is the kind of development work we are looking for in Sheffield. Let us give them something that is the real truth, and not merely tell them that we can do it. Let them come and see it, and do it themselves, and then the manufacturers will be far better convinced than by any amount of discussion with a gas salesman. Col. Carr does not think that a demonstration room is essential, except in some of the large undertakings. It is an absolute necessity in Sheffield, at any rate.

Mr. T. Carmichael (Portsmouth): I should like to ask Col. Carr, in dealing with gas used for industrial purposes, what variation in price he makes in relation to variation in the price of coal.

Mr. William Cash (President-Elect): I think we must be a little careful that we do not allow our enthusiasm to run away with our discretion. The interesting figures which Col. Carr has given show that the "cost of gas manufacture, inclusive of all charges," is 3·31d. per therm, but I understand that this figure does not include anything for distribution or anything for administration, and, also, it only includes the proportion of the capital charges which relate to the works and to the gasholders. When I turn back to the calculations which are given earlier in the paper, in arriving at an estimate of the cost of supplying an annual load of 90 million c.ft., I find Col. Carr clearly tells us that he still further amends his calculations by taking, in respect of the wages, for example, only half his wages costs. He says that on the additional consumption his wages would not necessarily go up in proportion to his output, calculated at a price per therm. I have no doubt that that is a sound argument, but I am saying that it is a considerable reduction—50 p.ct. Then, when we come to the next item, "repairs and maintenance of plant (half of existing average cost per therm as excess plant is at present maintained)," we must not lose sight of the fact that to the extent to which we use the excess plant we are hastening the day when it will be necessary to install additional plant. Surely the plant which is lying idle, so far as its cost of maintenance is concerned, cannot be compared with a plant which is operated to its full extent, and it seems to me a little generous to give the share of the cost of the maintenance of this plant for industrial purposes which Col. Carr has given.

Then again, Col. Carr says: "The general administration and accountancy charges are so small on a supply of this dimension that they can safely be left out of the calculation." Although he says that the charges on distribution and appliances incidental to the supply of a domestic load could not be taken into account, he has put in something for that in interest and sinking fund, above the cost of the main to the manufacturer's works. But he has nothing in for administration at all in all these figures. I am drawing attention to these, not because I want to say that Col. Carr is wrong, because you will all have to judge and make up your own minds in this matter in order to see to what extent you can allocate these costs in arriving at a figure which will be a fair charge for gas supplied for industrial purposes. At the same time, looking at Col. Carr's figures, they do strike one at first sight as being a very cut price. You will see that in the paper there is a commodity charge for large quantities down to 2d., with a discount of ½d. per therm, which brings the price down to 1½d. per therm; and one begins to wonder, without being able to work out the figures on the spur of the moment, what the actual quarterly charge will be, and whether we are not getting to a price at which there cannot be very much profit. The extent to which these things are being done in the interests of the power consumer means that some other consumer must be bearing the

costs which are not covered by the price charged to the industrial consumer.

Lastly, I do think we want to be a little careful with regard to this question of charges. The electrical people have a variety of means of calculating their charges, and, although it is said that imitation is the sincerest flattery, I am not sure that it is in all cases, and I do think a large number of the public are confused and irritated by the application of the electricity charges. Therefore, I hope that the Gas Industry is not going slavishly to follow the electrical industry in this matter, and that it will endeavour to devise a simple charge which the public can reasonably and quickly understand, based, if you like, on a scientific method which we can work out in our own offices.

Charges and Organization.

Mr. T. P. Ridley (Newcastle-on-Tyne): I want to refer to two items in the paper—namely, charges and organization. With regard to charges, Col. Carr refers to the economic charge. We all agree that it is obviously wrong to base charges for industrial supplies of fuel gas on the supply to domestic consumers. We have made analyses of our costs and revenue for the various classes of consumers, and the results show that the prepayment consumers as a class were paying £50,000 too little and the industrial consumers as a class were paying £50,000 too much. We cannot transfer that sum from one to the other right away, but must endeavour to bring them closer together gradually. We have found multiple part tariffs which we have had in operation for two years a very great assistance in selling gas for industrial purposes; and our industrial department claim that during that period they have not lost any existing gas appliances used for industrial purposes to any competitor, whether oil, electricity, or solid fuels. All undertakings at the present time have not the power to put into operation multi-part tariffs, but I think we are not without hope that it will not be long before we are in that position.

Charges must be economic not only to the buyer, but also to the seller; and I would like to emphasize the point which Mr. Cash has made in this regard. I consider that the commodity charge on the last block mentioned in the paper must never be less than the cost of production—*i.e.*, the commodity charge is the cost by which you multiply the quantity by 10 or 100 that you can produce at that cost. I have been somewhat puzzled by the figures in the paper which show that the commodity charge can be as low as 1½d. per therm on the last block. Col. Carr says that there are certain factors in the average cost which are common to all the charges—namely, net cost of coal, purification, and repairs of plant. These three items in the special quotation for an annual consumption of 90 million c.ft. come to just over 1·5d. per therm, and in that there are no wages for carbonization. I may have missed something in reading the paper in this connection, and if I have perhaps Col. Carr can enlighten me. It is not sufficient to say that the demand charge would be higher than the commodity charge, because you do not know what quantity of the commodity is going to be taken. Col. Carr sets out an estimate for supplying a particular load, and using the spare plant he puts in a very reduced charge. As a principle it must be remembered, as Mr. Cash has already said, that the spare plant will eventually be utilized and new capital expenditure will become necessary. Therefore, the question of charges on the spare plant must be treated with great discrimination.

The other point I wish to refer to is organization. Your 1926 President, Mr. John E. Cowen, said in his Presidential Address that " At present our industrial salesmanship is largely confined to working from the Gas Industry outwards—knowing what gas can do first, and discovering what has to be done afterwards. We want men to work as much, though not exclusively, in the opposite direction—knowing the industries and their problems well, and then finding in the Gas Industry afterwards the solution of those industries' needs." We at Newcastle have been organizing on these lines and have got together a staff of such technically trained officers, and we are exceedingly pleased with the results. I want to take this opportunity of appealing for the completion of the national scheme which was launched. It is only two years since the National Gas Council launched a scheme for large industrial sales of gas. Why it is not being developed I cannot understand. The scheme provided for a large undertaking in each district to which the other companies would come and co-operate, and then there was to be a central body for pooling the information and knowledge in the districts. Col. Carr emphasized the ideal of national organization, but in my opinion we have to start from the districts with such a scheme as has already been agreed upon, and I do hope that the various districts will quickly get their centres appointed and let us get on with the national central pooling scheme.

Sir David Milne-Watson: I have very great pleasure in moving a hearty vote of thanks to Col. Carr for his interesting and, I may say, provocative paper. I do feel with the author that it is most desirable to go out for this industrial load—indeed I am on the side of the bold and venturesome in this matter—but, at the same time, we must really be somewhat cautious as to the prices which we perhaps recklessly may be inclined to offer in connection with the supply of gas for industrial purposes, because we have to remember, as Mr. Cash has truly pointed out, that what we give away to the industrial consumer has to be got back from somebody else. Nevertheless, I do think there is room for a scaling-down of prices for such supplies on the industrial side. I am sure we are all very much interested in what Col. Carr has said in regard to the national scheme and also in what Mr. Ridley has mentioned—namely, that it is up to the districts to develop this. Nobody suggested, when the National Gas Council scheme was put forward, that it was a final one. We were trying to use the existing organizations; and I think it is perhaps a little hard towards that scheme that it should be called, as Col. Carr has called it, " indeterminate and unsatisfactory, in that it does not fix a definite responsibility for communal service." It is late now, but I shall have an opportunity of asking what Col. Carr means by " communal service " at some other time.

Benzole Production.

We have been talking a lot about gas supplied in cylinders for motor-car purposes in connection with Mr. Smith's paper, and I think it will be successful. In the meantime may I say I cannot understand why the Gas Industry as a whole does not take up benzole production more generally. In the production of benzole there is a splendid profit to be obtained, and it is a home produced fuel, the only home produced fuel at the present moment. With the addition of 3d. per gallon to the price of petrol I can assure you it is well worth paying attention to the production of benzole if you want to see a revenue obtained with very little trouble. Perhaps that will enable you to give something away in connection with the price for industrial gas if you wish to.

Mr. H. E. Copp (Hull): I have very much pleasure in seconding the vote of thanks which has been proposed to Col. Carr for his paper. I had it in mind to make a few remarks about the paper because I also could not understand some of the figures, and one figure I have been particularly struck with is in connection with his estimate for the supply of 90 million c.ft. He shows the interest, sinking fund, and maintenance charges on the cost of the main from the gas-works to the manufacturer's works as 0·14d. per therm. That represents a capital of nearly £20,000, and I think Col. Carr is to be congratulated if he is able to keep his interest charges down to that figure. I should also like the author to tell us something about his net revenue for the whole of his sales of gas. I believe that what we want to know is the price eventually paid by the consumer for the commodity supplied by the undertaking.

The Author's Reply.

Col. Carr, replying to the discussion, said: We have been told by Mr. Ingham of the interesting four-part tariff which he is putting into operation. The only danger I see in any four-part tariff is that, while it is true to say that a four-part tariff can be made more scientific, and more accurately balances with the costs as a whole, than a two-part tariff, the four-part tariff is too complicated for the average manufacturer to understand and appreciate, and he is reluctant to commit himself to a heavy expenditure in connection with a large consumption when the issue is not very clear to him as to cost.

The position as to the proportion of the charges between the domestic consumer and the industrial consumer, and the possibility that we are over-charging the small consumer, was raised by Mr. Willacy, who said that this was the concern of the Board of Trade. I see Mr. Ronca is sitting in front of me, but I think that even with our present accounts it is perfectly clear that, on the contrary, we are to-day supplying our domestic consumers in the majority of cases to a certain extent at the expense of our industrial consumers. Mr. Ridley has made that quite clear so far as Newcastle is concerned, and we know they are very progressive there in the matter of their charges to the industrial users.

From what Dr. Fells has said, he and I are very much agreed. I do not find in his suggestion for staffing a great difference from those I have put forward, except that he appears to have a greater belief in a multitude of experts rather than engaging a technically trained all-round man. For selling industrial gas, I think the technically trained all-round man—by all means working in conjunction with the laboratory and a highly skilled research worker—is the man to approach the industrialist, and who is going to be able to talk to him on his own ground, which is the primary essential of selling industrial gas.

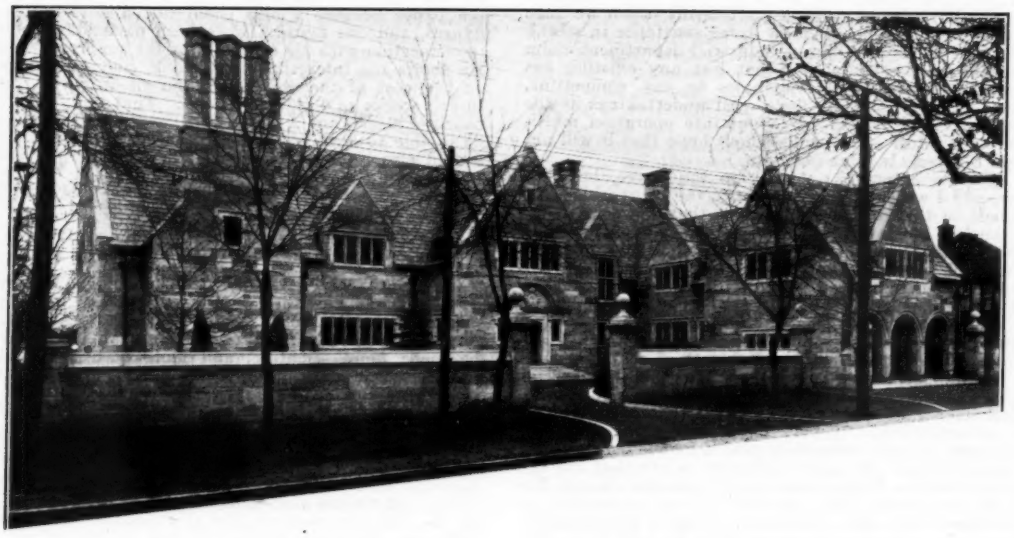
The question of what provision is made in special contracts for variation in the price of coal was mentioned by Mr. Carmichael. I give you an illustration. The net cost of coal last year was 1·1d. per therm, and it has been very close to that. It has been within 1d. and 1·2d. per therm for the last four years; and that being so we have in our large contracts a clause which provides that the net cost of coal as shown in our published accounts shall be the basis of the charge. With 1·1d. per therm as the cost of coal, if the net cost of coal exceeds 1·2d. the customer pays the difference. If it goes below 1d. per therm we agree to give him the difference; and it is a very equitable arrangement—better, in my opinion, than a contract based upon the price of coal, which does not take into account the residuals, which have such a great bearing on the resultant net cost.

I am in agreement with Sir David Milne-Watson and Mr. Cash that we should not let our enthusiasm run away with our discretion. I did not go into details of the two-part charge at length, but what I do want to point out is that in this two-part charge you have a certain consumption to take into account. You are bound to have a certain demand and you cannot get your demand in twelve hours below a certain amount. Let me give you an illustration. The Ford Motor Company consumed 150 million c.ft. of gas per annum when working day and night shifts before they unfortunately closed their works and went from Stretford to Dagenham. The result was that some part of their supply was charged below 3d. per therm, and in such circumstances there is the possibility of the total price paid by the consumer being below the average cost of manufacture. Of

course, if they were working only day shifts the charges would be considerably higher. I think the average was about 4½d. to 4⅝d., as near as I can say from memory.

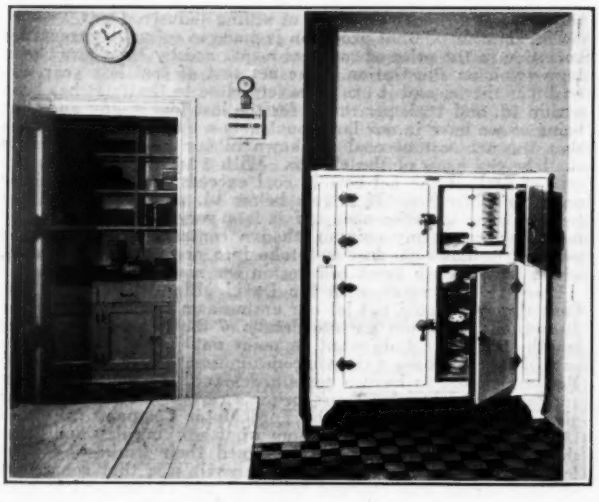
With regard to the point which Mr. Copp raises as to the cost of the main, I do not know how Mr. Copp works out the cost at £20.000. As a matter of fact, the cost of the main in this particular instance is approximately £3000, and I do not think my calculation is wrong; but, of course, I have allowed not only for interest and sinking fund, but also for this amount to be depreciated within the period of the contract, and the maximum contract contemplated is only five years. Therefore, the depreciation on the main is very heavy indeed, and this accounts for the relatively high cost per therm. If at the end of that five years the contract should not be renewed, then the gas undertaking and the other consumers of the gas undertaking are not penalized by the fact that I have made a special contract requiring a main of that size for a period of only five years. I do want to emphasize that I am not suggesting that I can sell gas in any quantity under any conditions at this price, but I particularly desire to call attention to the fact that this is a price basis on a 100 p.ct. load factor. In other words, the consumer is going to take gas in equal quantities for 24 hours of the day, for seven days a week, which is obviously a much cheaper load to supply than a load which is superimposed on the peak load. I still submit that the figures I have worked out are economically correct, because there are certain loads which are actually reducing costs and not increasing costs. Any load which has a 100 p.ct. load factor of this dimension is a cost reducer on the whole undertaking, and not a cost increaser; and I have provided for the cost of the extension of the plant that I should have to put down. I maintain the plant to supply that demand, in addition to the plant I have, in the figures which I suggest should be the minimum charge to be made to that particular consumer.

FROM THE HOME OF THE "CHEAPEST ELECTRICITY"



" Your requirements and ours probably vary greatly, but the underlying principle of the manifold usefulness of our fuel remains the same. It has occurred to the writer that it may interest you that, even in the home of the far-famed ' cheapest electricity in the world,' and within a hundred miles of the great hydro developments of Niagara Falls, there is still room for the active production and distribution of manufactured gas."

The above quotation is from a letter received from the Consumers' Gas Company of Toronto, who very kindly send us the accompanying photographs of what they describe as " one of the best examples of the all-gas idea." They are taken at the recently completed residence of one of their Directors, Mr. J. H. Wood—a seventeen room house in which gas serves nine distinct purposes. It is used for central heating, humidifying, cooking, water heating, refrigeration, laundry work, clothes drying, ironing, and rubbish incineration. Close co-operation between the Gas Company and the architect has assured practical and satisfactory installation in every instance.



A Neatly Installed Refrigerator.

Gas Cooking Equipment.

Some Views Regarding the Restricted Expansion of the Gas Industry and Counter Methods Adopted

By C. S. SHAPLEY, M.I.Mech.E., M.Inst.Gas E.,

Engineer and General Manager of the City of Leeds Gas Department.

Since the President asked me to write a paper for this Conference, and during the time I have been considering the form it should take, I have been pleased to notice that the Government have called together representatives of various industries with regard to the "Back to Coal" movement. I am sure the Gas Industry will look forward to the fruits of this meeting with great anticipation, as a movement of this nature must, of necessity, be progressive.

It is not to be thought that as a nation we are going back to the use of the open coal fire, belching forth smoke in the cities, towns, and rural areas. The activities of the Smoke Abatement Society have already shown that the open fire is responsible for an enormous amount of national waste. This has been so frequently written and talked about that it is unnecessary for me to go into any great detail, but I should just like to mention the damage to buildings both from a corrosion standpoint and the harm to paintwork with its incidental extra cost, to mention nothing of the enormous cost of washing due to the smoke pall. Therefore, to me there is a tremendous field for the "Back to Coal" movement, regarding it as one designed very materially to assist in the proper utilization of coal, and this can only be done at the gas-works, coke ovens, and electricity works. Probably in addition to this, research will make it possible to use pulverized coal for the navy and mercantile marine fleet.

Of course, if by any improbable chance the Government in saying "Back to Coal" mean the return to the open fire, then this would be an added interference which would further stifle the progress of the Gas Industry.

Restrictions.

The Gas Industry, though old, is happily thriving, but its progress is not what it might and should be because it has laboured for a number of years under very serious restrictions, which can be summarized as follows:

Antiquated Legislation.—The Gas Industry still continues to a large degree to work under very antiquated legislation—namely, the Gas-Works Clauses Acts of 1847 and 1871.

The restrictions contained in these Acts were quite in order during that period when gas certainly enjoyed a monopoly, and the gas consumer needed protecting; but to-day with the development of electricity, oil, and solid fuel, this monopoly no longer exists and competition gives the consumer a very substantial safeguard.

Successive Governments have received deputations from the Gas Industry on the question of the need for modernizing the legislation which governs it, but so far very little has been done. It is true that in 1920 the Government introduced the Gas Regulation Act, which gave the Industry certain elasticity in regard to quality and charge. Nevertheless, it was very belated, as during the war the Industry suffered very much until the Act came into force.

The Gas Regulation Act, however, has worked very well indeed, and I think it would be fair to say that the insistence upon a regular stated quality and pressure was a necessary safeguard to the consumer, but at the same time, quite a majority of my colleagues feel that similar restrictions should be placed on the electrical industry.

The Grid System.—The Electricity Commissioners are, and have been during the last few years, developing the grid system throughout the country, and it is justifiable to say that as a consequence and because of fears lest this grandiose scheme should fail for lack of custom, the electrical industry has received an enormous boost from the Government to the detriment of the Gas Industry, unintended no doubt, but none the less real.

Oil Tariff.—Up to the time of writing this paper, no public mention has been made of a tariff on oil. This I consider to be somewhat remarkable, as oil not only affects the Gas Industry very seriously, particularly in the industrial field, but it is also impossible to consider any chance of the "Back to Coal" movement maturing if oil is permitted to come into the country at the present low prices.

In advocating this tariff, I am alive to the fact that the Gas Industry is a large user of oil, particularly in the manufacture of carburetted water gas, and any tariff imposed would consequently place further hardship on the Industry, but it is in the national interest that money for the procuring of supplies of oil should not go out of the country when gas, electricity, and coal are capable of carrying out all the functions of oil fuel.

In passing, I might mention that I was particularly surprised, as were many others, to see the amount of space allotted to the Oil Section at the British Industries Fair at Birmingham last February, for oil is certainly not a home-produced commodity.

Tax on Petrol.—A higher tax on petrol would tend to develop the manufacture of home-produced spirit, and in this connection in my Presidential Address to the Institution of Gas Engineers, I laid very great stress on the necessity of all large gas-works washing for benzole. I am pleased to say that this is gradually extending; I hope it will increase at a very much greater rate than at present, as not only is it profitable, providing as it does an additional consumer, but it is also in the national interest.

Local Authorities.—Local authorities have not done all they might to assist the Gas Industry. It is a fairly common thing up and down the country to find the tenants of municipally-owned houses denied or restricted in the use of gas. The Kettering Gas Bill, which recently came before Parliament, will, I hope, have the effect of entirely removing this restriction.

Municipal Trading.—Many municipalities tend to restrict the activities of their gas undertakings on account of the fact that municipal trading is taboo in their particular districts, but this restriction is not in the interest of the consumer, as a municipal trading undertaking should be allowed to expand on legitimate commercial lines.

Profits.—Profits for the relief of rates have been taken in large measure in the past. This has been another restriction on the Industry, and an extra burden on the gas consumer of to-day, which, to say the least of it, is unfair. Gas should be sold at the cheapest possible rate in order to ensure its greatest possible development. This seems to me a positive obligation on the municipality in return for its monopoly rights.

Street Lighting.—Here again municipalities have in some cases totally eliminated the use of gas for street lighting, and others have substituted quite a lot of electricity for gas lighting, not on the score of efficiency or cost, but in many cases just because it is a question of fashion or to provide temporary work for the unemployed in making the change. Why not give them a further period of work by changing back again to gas? It is interesting to know, however, that the Gas Light and Coke Company have recently signed a contract for the lighting of many of the leading streets of the City of Westminster by gas until 1947. This is practical proof that gas is still supreme for public lighting when given a fair field and no favour.

Many municipalities have also substituted electricity for gas in existing schools, which procedure I consider to be not only bad policy, but unnecessary expense, as it is a well-known fact that gas lighting is kinder to the eyes, particularly those of the young. The London County Council, on the other hand, have adopted the wise policy of modernizing the gas lighting of hundreds of their schools at a fraction of the cost of installing electricity.

Ban on Showrooms.—In some cases the municipal authorities restrict the opening of district showrooms, and especially of showrooms in main shopping thoroughfares. This is more apparent where the municipality owns both gas and electricity undertakings, and there is naturally some feeling that unnecessary competition is being encouraged. On looking through recent publications of the Technical Press, however, I am pleased to note that this is gradually breaking down, as no fewer than 30 showrooms in different towns have been opened throughout the kingdom. If a municipality "keeps shop" it should keep a

modern and efficient shop in the best shopping part of its town or city.

In this connection it is pleasing to note the support given by the Birmingham Corporation to the local Gas Department in this matter, seeing that they own both the gas and electricity undertakings.

The Coal Mines Bill.—The Bill has now become law, and as far as the Gas Industry is concerned, its object is to maintain high minimum prices, and consequently an increase in the cost of coal, which in its turn means an increase in the cost of production of gas.

These are some of the handicaps that the Gas Industry has been called upon to face, and yet what is the position to-day? We find that *gas stocks stand firm* in the Stock Exchange quotations and the consumption of gas has steadily grown, as is proved by the following figures:

Year.	Annual Make.	No. of Consumers.
1882 . .	72,583,343,000	1,971,971
1912 . .	205,087,000,000	6,774,357
1917 . .	232,474,000,000	7,862,749
1922 . .	268,999,000,000	8,103,631
1927 . .	304,965,000,000	8,959,702
1932 . .	331,610,000,000	10,142,447
Increase .	61·7 p.c.	49·7 p.c. over a period of twenty years
,, .	356·8 ,,	414·3 ,, ,, ,, ,, fifty ,,

These figures prove that the Gas Industry has made enormous strides in spite of the handicaps mentioned, and this has been achieved by:

(1) Careful administration which has lowered the production costs, and
(2) Strict attention to sales and service.

Sales.

The most vital problem in our Industry to-day is the question of sales, and in expressing this view I am only re-echoing what the Prince of Wales said at the coming of age conference of the Incorporated Sales Managers' Association in Mav of this year. His Royal Highness said: "We want everyone engaged in every business to be on his toes," in addition to which he added, "The Buy British campaign needs to be complemented by a well-planned and persistent effort to 'Sell British,' not only at home but abroad."

If this is not applicable to the Gas Industry, then I should like to know to what industry it is, because gas is an all-British product in every respect, and we are consequently conforming to what is needed.

Therefore, I would urge politicians, both national and local, to give the Gas Industry every boost possible and a fair field, as gas is an all-British product, using British coal, British labour, and British materials.

In Leeds, gas sales work is divided into three sections, namely:

(1) Industrial appliances.
(2) Showrooms for all domestic appliances and fittings.
(3) Fitting, repairs of meters and appliances, maintenance of appliances, and gas meter inspection.

The whole of the industrial appliance business is dealt with at our Dewsbury Road Works. The fitting, repairs, and maintenance of appliances are handled at Bridge Street Works, and the Gas Inspectors have their quarters at the Finance Office, so as to have immediate contact with the City Treasurer's staff.

The showrooms are as follows:

The main showroom at the Market Hall, Ludgate Hill.
A district showroom at Crossgates (an area recently taken over from the Crossgates Gas Company).
One at the Finance Office, adjacent to the counter where gas, water, and electricity accounts and rates are paid.
Dewsbury Road Showroom, exclusively used for industrial appliances.
Bridge Street Demonstration Room used principally by architects, builders, and plumbers.

In addition, we have a travelling showroom, used for cookery demonstrations and the display of appliances in various parts of the city and suburbs.

Whenever a new site is selected an inspector visits the district served by the van and ensures that we have a full complement of consumers present at the daily demonstrations. As soon as he has filled in the day's complement, he proceeds with his ordinary work.

We commenced by circularizing the houses in the area each day, but this was not found to be as satisfactory.

I am satisfied that Leeds, with a population of nearly half-a-million is not at all favourably placed as regards showrooms, but I sincerely hope this will be remedied in the near future.

With regard to sales, it is very necessary that a very careful selection should be made of the appliances to be sold to suit the local needs. Our practice is to test a sample of every appliance submitted before exhibiting it in a showroom. The first is a laboratory test for efficiency, and if this is satisfactory, the appliance is then subjected to scrutiny as to manufacture and the ease of dismantling for any subsequent repairs.

Behaviour of Appliances in Use.

It is very necessary to go further and follow up the behaviour of the appliance on the district and get the practical experience of the consumer, who is, after all, the person to satisfy and who really decides for us what we should buy. We therefore watch the behaviour of the appliance in practical use, and for this purpose we utilize all available showrooms and in a number of cases the houses of members of the staff. We can thus assure the public of Leeds that the appliances they buy or hire from the Department are likely to give satisfactory service.

At each showroom as many appliances as possible are connected to a gas supply. At Bridge Street and Dewsbury Road all appliances are metered, so that any prospective consumer may have an opportunity of ascertaining before purchasing, the costs of running.

In addition to the above, arrangements have been made with the Master Plumbers' Association, through which the Department offer to fit a display of appliances in the window of any local plumbers' premises. On all orders introduced or taken by the plumber he receives a commission and is also allowed to fix the appliance in accordance with the scale of charges arranged with the Association.

The showrooms are some distance from the Fittings Depôt at Bridge Street, therefore the policy is to concentrate all outside salesmen at Bridge Street daily, in order that they shall be in touch with the fittings staff.

The outside staff inform the showrooms from which any inquiry emanates of the result of their visit to the prospective consumer, and by this means both staffs work in complete unison and prevent overlapping, dual visits, and possible annoyance to the consumer.

For the purpose of dealing with the fixing of appliances, the city is divided into a number of districts. A salesman, fittings inspector, and a number of fitters are attached to each.

It will readily be seen that this enables the salesman to give instructions to the inspector or to the fitter direct if he so desires. Our salesmen have been trained and recruited from the Fittings Staff, and are practical men, so that in addition to taking the order, they are able to measure for the material required for the fixing, thereby saving excess material being sent to the job.

Requisitions are sent to the stores for all appliances and materials required for a complete job. The materials, &c., are then sent by transport to consumers' premises, and the work is executed as near as possible on the following day.

Following-Up.

We have adopted the policy of following-up every job, as, in our opinion, a sale is not properly completed until the purchaser is satisfied and thoroughly understands how to use the appliance to the best advantage.

On taking the order for a new cooker, the consumer is asked if she understands how to use it, or if she would like the services of a cookery demonstrator. The information is duly marked on the order, and, if required, a cookery demonstrator calls.

In these days, in order to progress, it is necessary to have the employees whose duties bring them in touch with the consumers, made familiar with all types of domestic appliances. The Demonstration Room at Bridge Street is, in addition to its other purposes, used as a training centre, and it is the practice for all these employees to receive instruction in any new appliance, and to have a refreshing course once every three months on all appliances. This also applies to gas inspectors.

Gas inspectors have a ready access to all houses, and if these men are trained and encouraged they will bring in inquiries and obtain orders. This, at any rate, is our experience in Leeds. In addition, we find that our fitting staff appreciate the organized talks on appliances and are introducing new business as a result of our contact with them.

I have so far dealt with obtaining new business, but we must not forget that in these days of severe competition and intensive canvassing by competitors, it is vitally necessary to ensure that an appliance once fitted is kept in commission and continues to give satisfaction.

To this end we endeavour to assure ourselves that gas

fires and radiators in shops and business premises are in thorough working order; a gas fire with broken or badly adjusted radiants does not induce others to purchase; on the contrary, it is a very bad advertisement.

We have adopted the practice of writing a signed introductory letter, which is followed by the visit of a technical representative. In the majority of cases the official is well received, and consumers appreciate the service given, so much so, that over 10 p.ct. of the visits have produced new business and quite 50 p.ct. of the consumers have been found to have appliances badly out of adustjment or very inefficiently fixed.

Service to the gas consumer should be the cry of the Gas Industry, and to this end, six months ago we instituted a number of motor service vans, tastefully painted and lettered "Gas Never Fails," to deal with complaints which were previously given to ordinary district fitters. Selected fitters were taught to drive, and complaints of all kinds are now dealt with most expeditiously, as the vans are equipped with all parts and material ordinarily required, even to a few meters in case of a change being necessary. This service has been greatly appreciated by the consumers and has resulted in considerable saving, as one man with a van does the work previously performed by three fitters on foot.

Scales of Charge.

In coming to the conclusion of the counter methods adopted in Leeds, I have kept what I think is the most important to the last—viz., scales of charge. As all gas engineers and distribution engineers know, this is a very big subject, and one which occupied the attention of the National Gas Council in conjunction with an influential committee for many months, and whose report has been invaluable to me in formulating the best scheme (in our opinion) for Leeds.

Bearing this report in mind we commenced by making a thorough survey of every consumer's account, which was a very big task, but one that is necessary to every undertaking, as the facts revealed an alarming state of affairs.

In order to illustrate this, I append a statement showing the position existing in Leeds in August, 1929. (Appendix A.)

We had to decide from this statement where a consumer began to be remunerative. This, of course, will vary in all undertakings, but one thing impressed us as certain, and that was that one penny or even sixpence reduction per thousand would never have the effect of increasing the smaller consumptions of gas because we ascertained that a very large percentage of the small consumptions were from quite good class houses, where gas was being used in very small quantities, practically as a stand-by.

Consequently we adopted the scales of charges which are appended, keeping up the price of gas to the small (not necessarily poor) consumer. Any possible reduction, in our opinion, should be applied to the remunerative consumer.

The scale of charges was unfortunately launched immediately prior to the national crisis, and therefore we have not felt the advantage we know we shall get when the country recovers, as we are satisfied that had we not adopted the scheme, we should have lost ground with our large domestic consumers. To put it another way, when we are able to point out to a consumer that all excess gas can be purchased at 1s. 1d. per 1000 c.ft. below the cost of the first 5000 c.ft. we have a reasonable hope of getting new business, thus giving the salesmen a wonderful talking point.

The advantages of the scheme are:

(1) All consumers are on the same basis of charge.
(2) Inducement is offered for further consumption.
(3) One meter only is required per premises, reducing expenditure on meters.
(4) Complicated scales of charges are abolished.
(5) After the first 5000 c.ft. the large reduction enables us to compete successfully with all forms of fuel, *vide* Central Heating Scale, gas at 1s. 2d. (Appendix B.)
(6) The removal of the annoyance caused to the consumer by charging gas for one operation on the same premises at a different price from that used for another operation. Or in other words, gas used in one premises for any purpose, is charged in accordance with the scale.

As proof of this we recently obtained the cooking load at Lewis's new stores in the Headrow, in face of severe electrical competition, and nothing but the new scale and the efficiency of gas obtained what I hope will be a ten million per annum consumption.

The enormous improvement in the efficiency of gas appliances during recent years has had the effect of reducing the amount of gas consumed per consumer. This is a restriction which the Industry does not cavil at, as it has enabled us to retain business and get further business.

For this we are indebted to the manufacturers in a very large measure, and having said this, may I make two suggestions to them?

(1) The price of gas fires in particular is too high in view of the portability of other types of heating units, which makes it possible for one unit to serve at times the occasional needs of a household.
(2) Gas has a tremendous pull over its electrical rival on account of the speed at which any cooking or heating operation can be carried out. There is a tendency just now to sacrifice speed for efficiency, and as efficiency to the housewife means speed, I hope to see one large type drilled burner on every new stove. The efficiency burner now fixed tends to make the operations too slow—a very real disadvantage.

A great deal of work has been done in addition, such as showing at exhibitions, Press advertising, organizing of conferences, &c., and all these activities have tended to keep the name Gas before the public, and here the British Commercial Gas Association stands out pre-eminent.

In conclusion, the word Gas has been before the public for over 100 years, and has now become commonplace. I should like to see a new word or phrase adopted, which would adequately suggest all that gas represents.

APPENDIX A.

Analysis of Consumptions under 20,000 C.Ft. per Annum, in City of Leeds, as at August, 1929.

			Gas Consumed. C.Ft.
Number of consumers under 2500 c.ft. per annum—			
Automatic	533	..	937,800
Ordinary	1,407	..	2,372,500
Furnace rate	29	..	43,000
	1,969		3,353,300
Number of consumers between 2500 and 5000 c.ft. per annum—			
Automatic	2,603	..	10,482,300
Ordinary	3,849	..	14,947,700
Furnace rate	21	..	81,000
	6,473		25,511,000
Number of consumers between 5000 and 7500 c.ft. per annum—			
Automatic	6,324	..	40,717,300
Ordinary	5,715	..	35,912,200
Furnace rate	19	..	116,700
	12,058		76,746,200
Number of consumers between 7500 and 10,000 c.ft. per annum—			
Automatic	10,890	..	96,498,400
Ordinary	6,641	..	58,177,800
Furnace rate	21	..	174,500
	17,552		154,850,700
Number of consumers between 10,000 and 20,000 c.ft. per annum—			
Automatic	35,889	..	506,376,000
Ordinary	16,539	..	234,443,000
Furnace rate	43	..	609,300
	52,471		741,428,300
Under 20,000 c.ft. per annum—			
Total	90,523	..	1,001,889,500
Total number of consumers in the city			135,995
Total gas consumed			2,900,926,000 c.ft.

APPENDIX B.

CITY OF LEEDS GAS DEPARTMENT.

Scale of Charges for Gas for Central Heating Only.

Gas Consumed on One Premises Only per Quarter.	Per 1000 C.Ft.	Per Therm.
	s. d.	d.
To 100,000 c.ft	2 0	5·11
Over 100,000 to 500,000 c.ft.	1 9	4·47
Over 500,000 to 3 million c.ft.	1 6	3·83
Over 3 million to 4 million c.ft.	1 5	3·62
Over 4 million to 20 million c.ft.	1 4	3·40
Over 20 million c.ft.	1 2	2·98

NOTE.—The consumption of gas for any purpose in respect of separate premises in the occupation of the same person, firm, or company shall not be aggregated in computing the charge to be made.

DISCOUNT.—The above prices are subject to a discount of 5 p.ct. if the account is paid within one month from date of delivery.

NOTE.—For charges for hire of meters, see separate Scale "C."

By order,
C. S. SHAPLEY, M.I.Mech.E., M.Inst Gas E.,
Engineer and General Manager.

Gas Offices, Market Hall, Leeds.

APPENDIX C.

CITY OF LEEDS GAS DEPARTMENT.

Scale of Charges for Gas.

(Supplied through Prepayment Meters.)

Notice is hereby given that from and after the last meter reading in June, 1931, the prices charged for gas will be in accordance with the following scale :—

Gas Consumed on One Premises per Quarter.	Per 1000 C.Ft.	Per Therm.	C.Ft. per Penny.
	s. d.	d.	
For gas supplied through prepayment meter without stove or fittings—			
First 5000 c.ft.	3 9	9·57	22·2
Over 5000 to 16,000 c.ft. . . .	2 8	6·81	31·2

For consumption over 16,000 c.ft., see separate Scale "A."

Where gas appliances are supplied, extra charges will be made as follows :

If unpacked slot cooker is supplied . . .	3d. extra per 1000 c.ft.
If packed cooker is supplied	6d. " " "
If gas fire is supplied	6d. " " "
If ring burner, 1 drop pendant and two brackets are supplied, but without cooker	6d. " " "
If packed cooker and one gas fire are supplied	8d. " " "
If two gas fires are supplied	9d. " " "

NOTE.—For charges for hire of meters, see separate Scale "C."

By order,
C. S. SHAPLEY, M.I.Mech.E., M.Inst Gas E.,
Engineer and General Manager.

Gas Offices, Market Hall, Leeds.

APPENDIX D.

CITY OF LEEDS GAS DEPARTMENT.

Scale of Charges for Gas.

(Supplied through Ordinary Meter.)

Notice is hereby given that from and after the last meter reading in June, 1931, the prices charged for gas will be in accordance with the following scale :—

	Gas Consumed on One Premises per Quarter.	Per 1000 C.Ft.	Per Therm.
		s. d.	d
A.	To 16,000 c.ft.—		
	First 5000 c.ft.	3 9	9·57
	Over 5000 to 16,000 c.ft.	2 8	6·81
B	Over 16,000 to 500,000 c.ft.—		
	First 100,000 c.ft.	3 0	7·66
	Over 100,000 to 500,000	2 8	6·81
C.	Over 500,000 to 750,000 c ft.—		
	First 100,000 c.ft.	3 0	7·66
	Over 100,000 to 750,000 c.ft.	2 7	6·59
D.	Over 750,000 to 1 million c.ft.		
	First 100,000 c.ft.	3 0	7·66
	Over 100,000 to 1 million c ft.	2 6	6·38
E.	Over 1 million to 2½ million c.ft.—		
	First 100,000 c.ft.	3 0	7·66
	Over 100,000 to 2½ million c.ft.	2 5	6·17
F.	Over 2½ million to 5 million c ft.—		
	First 100,000 c.ft.	3 0	7·66
	Over 100,000 to 5 million c ft.	2 4	5·95
G.	For consumption of gas in excess of 5 million c.ft. per quarter Scale "F" shall apply, *plus* the following charges :—		
	Over 5 million to 6 million c.ft. . . .	1 10	4·68
	" 6 " 7 " "	1 9	4·47
	" 7 " 8 " "	1 8	4·25
	" 8 " 9 " "	1 7	4·04
	" 9 " 10 " "	1 6	3·83
	" 10 " 20 " "	1 4	3·40
	" 20 million c.ft.	1 2	2·98

NOTE —For central heating only, see separate Scale "D."

NOTE —The consumption of gas for any purpose in respect of separate premises in the occupation of the same person, firm, or company, shall not be aggregated in computing the charge to be made.

DISCOUNT.—The above prices are subject to a discount of 5 p.ct. if the account is paid within one month from date of delivery.

NOTE.—For charges for hire of meters see separate Scale "C."

By order,
C. S. SHAPLEY, M.I.Mech.E., M Inst.Gas E.,
Engineer and General Manager.

Gas Offices, Market Hall, Leeds.

Discussion.

Mr. R. HALKETT (General Manager, Sheffield Gas Company): I am pleased to see that Mr. Shapley has dealt with smoke abatement, because I think that no other industry in the country is able to deal with it like the Gas Industry. I had an idea that the domestic chimney was the sinner so far as smoke emission is concerned, but I never realized that it was of such great importance as I did about twelve months ago. On a morning in October, when we had had a sharp frost, I went on the hills outside Sheffield about seven o'clock in the morning. The sun was shining, and you could see all over Sheffield, but immediately the house fires were brought into operation, with the heavy atmosphere the smoke came down, and within an hour you could not see the houses. This proved to me that we have an opportunity of pushing forward the commodity which we deal in, in a manner which I am sure will not only be helpful to ourselves but to the community at large. Mr. Shapley has dealt with the electric Grid, and I am pleased that he has done so, because I consider that is a matter of vital importance to the Gas Industry. There has been a great deal said about the Grid, but I do not think we have anything to fear. I know the Chairman of the Electricity Commissioners, when that body was brought into existence, said he could not see how the price of electricity could be reduced by more than ½d. per unit.

CO-OPERATION WITH LOCAL AUTHORITIES.

Then I think we might endeavour to court the best friendship we can with our local authorities. We have endeavoured to do that as much as possible in Sheffield, and, I am pleased to say, with a certain amount of success. So far as public lighting is concerned we have, I think, about 16,000 gas lamps, against 2000 to 4000 electric lamps. The electrical undertaking is a municipal one, and we are not over our difficulties. We are at the present time fighting against the municipal electrical department in Sheffield in connection with putting in street electric lamps in place of gas. The electrical engineer a short time ago brought forward a scheme whereby he proposed to convert 1000 gas lamps per annum for ten years. Then he dropped the period to six years and brought figures forward to the Council, and in that way reduced his charges by about 50 p.ct., and yet gas held the sway by 5s. 4d. per lamp. It was going to cost the Corporation £3000 to convert every 1000 gas lamps. We did not feel disposed to sit down to that, so the day before the Council met to consider this proposal I addressed a letter to the local newspapers, and I also circularized the whole of the members of the Council; and I am pleased to say that we met with a certain amount of success, as the minute was referred back for further consideration.

To back that up I endeavoured to obtain, and was successful in obtaining, an interview with the Press. In all the local authorities outside the Sheffield area where my Company supplies we have the whole of the public lighting. I advanced that in the Press, and those who are in favour of gas on the Council will have something to bring forward when the matter is again discussed.

Mr. Shapley has dealt rightly with regard to showrooms for a gas undertaking. I think it is a false policy if gas undertakings do not go in for showrooms. When I took on my duties in Sheffield we had not a showroom apart from the one at the General Offices, which I considered was not in a position to obtain business. I immediately brought the matter before my Directors, and after a little persuasion they allowed me to go ahead and obtain main showrooms. It was some time before I could obtain what I considered were the most suitable premises, but after a time I was successful; and now we have a showroom right in the heart of the City. When I tell you that since we have done that our showrooms have been responsible for 78 p.ct. of the sales, and that the remainder has been obtained by our salesmen on the districts and by district inspectors who are supervising and fixing the appliances, you will appreciate the value of showrooms. We have gone still further, and now have five additional showrooms; and I am pleased to say that everyone is paying its way.

Then Mr. Shapley mentioned the necessity for making the whole of the staff familiar with the articles they are to handle. That undoubtedly is a very good business method. We in Sheffield endeavour to keep our men up-to-date with all the appliances by arranging during the winter months lectures at which we can point out to them the construction of the appliances and the difficulties that might arise. In this way we are able to obtain the highest efficiency possible when the appliances are fitted.

Mr. P. S. HOYTE (Plymouth): Mr. Shapley suggests a tariff on oil. What does he consider is the figure we should have as a tariff and which would help to keep oil down, or out of public use, and so reduce the present extent to which it is engaged, not merely on the gas business, but on the coal business. I was in South Wales last week, and it was astounding to find that, in spite of the condition of the coal industry, people are buying foreign oil to displace coal in South Wales itself. You have the same experience in Leeds, where you are practically on top of a coalfield. We heard from our President yesterday that the Gas Industry carbonizes about 18 million tons of coal and employs something over 100,000 men. Actually the Industry employs practically double the figure mentioned, because if you take as a rough average that each miner raises 200 tons of coal a year, the Gas Industry is keeping 90,000 miners in permanent employment. Thus, for every 200 tons of coal displaced in this country by oil, you are putting one miner out of work. There is little doubt that we shall have to get back to coal.

COST COMPARISONS.

Mr. F. H. ROBINSON (Harrogate): Dr. Smith has quoted figures from Harrogate. You might be interested to know that originally the idea of making the comparison mentioned by Dr. Smith came about through the intense competition of the Electricity Department in Harrogate with electric cookers. I got into touch with the B.C.G.A., and they gave me a few ideas, one of which was to show the comparative costs; and we extended the idea still further to show the household budget of houses of different rateable values, and it yielded some very interesting facts. Dr. Smith has already quoted you the figures for ordinary meter supply, but he did not quote the cost of the slot meter system. With a 20,000 c.ft. consumption the average revenue from a slot meter consumer in Harrogate is

£3 19s. The annual cost for the same service for electricity—and I want you particularly to bear in mind that it is exactly the same service, because we can substantiate it on our part, and the electricity people base their estimates on the same figures—for the slot meter system would be £12 a year. With the all-in domestic tariff the electrical people make a minimum charge to £2 5s. per annum for houses up to £15 a year, and the total cost, including supply and a cooker, comes to £7 2s. 1d. for that size house. In the electricity department showrooms they have a notice, "Free cookers and repairs. These cookers are fixed free of hire charges; no fixing charges." When you go inside the showroom, however, you get a form, and in the corner it says, "For an extra ½d. per unit for the first 96 units this will cover hiring charges." We have tried to counter this by writing to the electrical people and enclosing a copy of these tables and costs which I have prepared, and it has had the immediate effect of causing them to alter the whole system. It has shown up their prepayment system in a very bad light, and they are now going round to their own housing schemes and saying, "We will fix electric cookers for 1s. 2d., 1s. 5d., or 1s. 9d. a week on your rent, and we will charge you ½d. per unit for all electricity you use." The people, however, have the very haziest idea of what their current will cost them. They have only a ½d. per unit in mind, and we have to disabuse their minds of this fact.

Another thing that is being done in this method of camouflage is that they put out water heaters—Ferranti or other types—and they say ½d. per unit without any limitations as to minimum consumption. These heaters are fixed at the expense of the user; but this is how the Corporation Electrical Undertaking protects itself. The plumber fixing the charge has to send in his bill to the consumer, and the plumber has to carry the bad debts. The whole thing is camouflage. There is another point. The Corporation are running cables all over the place, and in districts where they cannot possibly pay an adequate return on the expenditure. For example, they are taking cables to small districts twenty miles away, where there are only a few scattered farms. The whole thing appears to me to justify Sir Francis Goodenough's view that the Grid system is a white elephant, and that the authorities in London are inspiring the local people to get current taken whether it pays or not.

Mr. WILLIAM CASH: Mr. Shapley gives the scale of charges for gas supplied through prepayment meters, and shows that where gas appliances are supplied extra charges are made. These extra charges are adjusted in the rate according to the type of apparatus. At the same time for consumptions over 5000 c.ft. a lower price is charged. I should be interested to know how Mr. Shapley adjusts the charge where the consumption rises above 5000 c.ft.

With regard to what was said by a previous speaker concerning oil, some of us have made calculations, and the net effect of it would be how a duty on oil would affect us on the contrary side where we are using carburetted water gas. I thought Mr. Hoyte's observations on the displacement of miners would make extremely valuable propaganda. Then I was interested in Mr. Halkett's remarks on how showrooms can be made to pay. I happen to represent two rapidly growing districts, Croydon and Bournemouth, as well as Barnet, where we get large numbers of additional consumers as the districts grow, and we have a special field for selling through showrooms. I have had figures taken out on what we consider a really fair basis, charging the showrooms a rent for the building and charging all the direct salaries and percentage charge on to stock locked up in the showroom together with a commission on outside work done, and on the sales effected through the showrooms of sulphate and coke. We have found there is quite a reasonable profit on the turnover in our showrooms taken altogether. Of course, a showroom in the centre of the district will naturally do more than a showroom in an outlying district, but it is in the outlying districts that business can be obtained; and putting the showrooms together we found that our showrooms could be made to pay.

Mr. A. W. SMITH (General Manager, Birmingham): With regard to this question of coal, I agree entirely with the remarks of Mr. Hoyte in this matter. I am a little doubtful whether we may hope for a tariff on oil, however. The ramifications of the oil industry are so tremendous and the influence they command is so great, and the capital the Government itself has sunk in the Anglo-Persian Oil Company is again a factor which we have to remember. Personally I think we have to look for a more economic arrangement in the coalfields themselves. I am a little disappointed at the mentality of the so-called statesmen of the coal industry in this matter. It cannot possibly be for the good of the coal industry in the end when such circumstances as these arise. A Director of one of the largest collieries approached me not very long ago and said he would be very happy to renew my contract at the same price as in the previous year, because he could make a very good profit on it. But he said that he must not charge under a certain price, which was one which would bring him in a profit beyond the dreams of avarice. As a consequence, said this Director, he was losing all his business. That is what is going on in the coal industry under the present system of price-fixing. We are suffering, as Mr. Shapley has very clearly pointed out, from the fact that we have to pay the same price per ton for a 100,000-tons contract in the present condition of things as the man who buys one truck only. This is admitted by the other side—and there are any number of critics in the coal industry itself—but apparently they are not putting matters right. Whether they will succeed in doing so I do not know, but if things go on in this way I can only see the smash-up of either the price-fixing scheme or of the coal industry itself. The coal industry has to face the wages question at the end of July; the "Gentlemen's Agreement" ends in July, and unless prices are better in some way I cannot see how the industry can maintain the present rates of wages. If there is any trouble over wages, the Government are bound to step in, and again we are almost bound to have Government interference in the coal industry. I do hope that there may be some brains in the coal industry that will find a way through this impasse which apparently the industry is in at the present time. All that the leaders of the coal industry, however, have been able to do hitherto is to make a dead set against the public utility undertakings. They have admitted quite openly that they are out to get more from the gas and electricity undertakings and other public utilities, who, they say, are protected in their trade. That, I suggest, however, is bound to fail in the end, because they do not realize the competition that we are helping the coal industry to fight against oil, particularly in the larger industrial areas. I am very pessimistic personally as to what the outcome is going to be, and can only hope that someone may find a way through it. The smashing up of the price-fixing scheme would be a terrible thing for the coal industry—one realizes that—and the industry at the moment is discussing, I gather, schemes for holding companies for the whole of the Yorkshire collieries, and a scheme of selling areas for the whole of Great Britain. Neither of these, so far as I can gather, are very popular with the coal industry itself, and we can only hope that something may arise which will enable them to co-operate with us in defeating, in my opinion, their worst competitor—oil.

With regard to showrooms, I am not quite sure that we ought to look upon these from the point of view of making them profitable in themselves. We could all probably produce a balance-sheet showing that our showrooms are profitable, but that is not the only outlook we should have. We have a definite service to render to the community, and we in Birmingham are placing showrooms so that, if possible, each one of them has a two-mile radius to serve. We find that that is appreciated tremendously by the consumer, and it enables us also to decentralize our fittings. Our fitters all have their little workshops and centres in these various district showrooms, and as a result the walking time on non-chargeable jobs is cut down considerably, while the time on the chargeable jobs is also reduced, in the interests of the consumer. That in itself is a complete justification for extending these district showrooms. The argument I put to my Committee is that we are not actually opening showrooms, although we pick a spot where the showroom can be a good one, but we are really de-centralizing our fitters and fitting service among the various communities and in the outskirts of our large cities. That is a justification, apart altogether from the question of whether it pays on a purely balance-sheet basis.

One question which Mr. Shapley has raised refers to price, and it is perhaps a delicate one. I have been looking through the scale of charges at the end of his paper, and I rather like his scale to the general consumer, which is arranged in parcels, with a minimum charge in each parcel. That seems to be quite a good idea and a very good incentive to increase consumption, but I am a little puzzled as to how he can justify in an industrial city a special charge as low as he has made it for central heating purposes, which is lower than the charge to a manufacturer taking the same quantity of gas for ordinary power purposes. The central heating load is only a seasonal load, and from the gas engineer's point of view it is not so attractive as an all-the-year-round load from a manufacturer. Although I have been considering this matter in Birmingham, I cannot see how I can possibly justify, to the many manufacturers we have on our books, making a charge for central heating at a lower price than those manufacturers are asked to pay for gas for manufacturing purposes.

It may interest you to know that during the last few weeks we have been endeavouring to improve the service to our consumers. We have been dissatisfied for a long time with our efforts to deal with complaints which come in after office hours. We all have various systems, and at one time we had a system in Birmingham by which a number of fitters stood by until 11 o'clock at night. Of course, we always had one man at Head Office all the time on the telephone, but all this was unsatisfactory. Then we arranged for a certain number of fitters, whom we called emergency men, and who were on a rota, to be on call at their homes in the various districts. We had to communicate with them, however, through the good offices of a consumer or through calls to the Police Station, and this was still more unsatisfactory. Now we have started a scheme which, judging by the letters I have received, bids fair to be really successful. We have arranged for three or four fitters—we have a number of fitters on the rota—who can drive a motor-car or are willing to learn to drive a motor-car, and we have established a fleet of Austin Seven motor vans. As soon as a telephone call comes in or a communication arrives, one of these men goes out straight away in the motor van, carrying a spare meter and all the tools he may require, and when I tell you that on more than one occasion letters of appreciation have stated that the man had attended the job before the father had got back from the telephone box to his home, you can appreciate what is happening. We have only just started this experiment, but it has been very successful even in its initial stages, and I am quite sure that we shall continue it and add to it in order to serve the outer districts as well.

With regard to legislation, as you know, I was honoured by being appointed to the Committee which is dealing with this matter, and I should here like to say—I have said it before at

the National Gas Council meetings—how much the Gas Industry, and particularly the company side of it, owes to Mr. Ridley, who is also serving on this particular Committee. Mr. Ridley has produced voluminous statements and statistics, and I am very hopeful, in fact, I can say it is pretty certain, that at our next meeting, which will be held in the course of a week or so, we shall come to a definite agreement with regard to this question of gas charges. Then the report, I hope, will go through to the main Committee and will be approved by them. It will not satisfy everybody, but one has in these days to compromise here and there. We cannot have our own way in everything, and we have to recognize that the Board of Trade is watching this matter with one eye on the political aspect, and the other on the point of view of the consumer, who has hitherto been the pampered consumer. But I think, taking everything into account, that the result of our very long and laborious work will be satisfactory.

Sir FRANCIS GOODENOUGH: I should like to say, with regard to the question of showrooms showing a profit, that I do not know whether Mr. Cash gives his showrooms any credit for the increased sale of gas arising from the sale of apparatus at the showrooms, but surely a showroom is entitled to some credit from that point of view. At the same time, I want to say that the undertakings Mr. Cash speaks about are undertakings of a very high standard in regard to local publicity and salesmanship. These undertakings give first-class service to the public, and they educate the public by their publicity and try to get the public in the right attitude of mind by good salesmanship. Such publicity and such salesmanship pay for themselves in that you can, if you have your public handled right, get a fair price for your fixing work and you can get a fair price for apparatus. You need not give anything away "with a pound of tea" if your salesmanship is right, and the Gas Industry to-day can get a better price for its apparatus and fixing work than it got before it adopted progressive methods of selling and publicity. Good local advertising is not an expenditure, it is an investment, and it helps you to get a good commercial price for what you have to sell.

I am very much interested to hear what Mr. A. W. Smith said about dealing with complaints after hours. Any method that will reduce the time lag in dealing with these complaints and bringing about satisfaction on the part of the complainant is of great value, and I congratulate him on another instance of the progressive policy of the Birmingham Gas Department.

May I also, before I sit down, thank Mr. Shapley for his most interesting paper, and say again a little more deliberately than I was able to say it last night, when everybody was anxious to get away, how much we all owe to him and his staff for the arrangements in connection with this conference. Again, as I do not think I shall have another opportunity, may I tell you, as Chairman of the Association, how much you all owe to your President, Major Kitson, for the work he has done during the past twelve months. I am in a better position than anybody to know the assiduity with which he has attended to his duties. He has been of enormous help to me in carrying through the somewhat difficult changes that have taken place, and we all owe him a very real debt of gratitude. I am afraid I am anticipating Mr. Cash in his pleasant duty of proposing the health of the President later on, at lunch, but I know he will forgive me because, as the working Executive Officer of the Association does know all about the work of the President, I can say that he has done "a damned good job."

Mr. WILLIAM CASH (President-Elect): With regard to what Sir Francis Goodenough and others have said concerning showrooms, I do not wish it to be understood for one moment that I would not put in showrooms if it were not thought they were going to "pay." What I wanted to say was that even when showrooms have been treated on a very strict basis from the point of view of paying their way, they have done so, but, of course, they have an additional advantage beyond increasing sales, and that is with regard to the question of publicity and convenience to the consumer. Again, when showrooms are decentralized it is possible to de-centralize the fitting work, as has been said already, and that is of enormous advantage. On the other hand, in many instances showrooms by themselves can be made paying propositions, although I do not wish it to be thought that I would say that they should not be put in if they cannot be made to pay.

THE AUTHOR'S REPLY.

Mr. SHAPLEY, replying to the discussion, said: With regard to smoke abatement, mentioned by Mr. Halkett, if the Government would do what I would like them to do there would be no more raw coal used in this country after, say, five years. That would solve that problem. It is necessary, and it should be done. You have only to look at cities such as Sheffield, Halifax, and Leeds, even on a Sunday morning, to see what is happening, through the domestic chimneys. It is simply shocking.

Mr. Robinson has to meet a very severe competitor, and I am glad to see the way he is doing it. The figures he has put forward should at least prove to the members of the Council in Harrogate that the charges that are being made in connection with the electricity undertaking are not right. If, of course, Mr. Robinson's undertaking in Harrogate were a municipal one he would be in a much better position.

The question as to how we adjust the prices for large supplies was raised by Mr. Cash. The position is that we have a rebate system with these large prepayment users, and if there is any money over when the collection is made we give it back to the consumers. It is very simple.

I am glad that most speakers agree with having showrooms in various parts of the district. Mr. Smith is quite right when he says that it saves cost on the non-chargeable jobs and also on the chargeable jobs, and, therefore, it saves not only the municipality or the company money, but it also saves the consumer money. We have a little showroom at Cross Gates, five miles away, where we have six fitters, and this saves an enormous amount of walking time. In connection also with what Mr. Smith said concerning complaints, an "Escapes" 24-hours' service has been in use ever since I have been connected with the Department in Leeds. Throughout the day we have available a series of vans, and, for the benefit of the electrical people, we have a notice on the vans, "Gas never fails." These vans are completely equipped, with two or three meters and everything else that is likely to be wanted, such as main taps, fittings, mantles, &c.

With regard to the charges for central heating, we spent an enormous amount of time on these, and I do not know how many scales were brought forward and considered before we got at the present one, which was designed after looking at all our industrial consumers' bills. This scale has enabled us to get central heating business which we should never otherwise have got, but the industrial consumer who is getting gas at the industrial rate, which is a very low one, can also avail himself of central heating if he chooses. The central heating rate is for a load we should never get in the ordinary way, and it is very good business.

VOTE OF THANKS.

Prof. ARTHUR SMITHELLS, proposing a vote of thanks to Mr. Shapley for his paper, said: The task that has been given to me is really work of supererogation, because I think everybody who has spoken in the discussion has really proposed a vote of thanks to Mr. Shapley. However, I have the greatest pleasure in putting it into formal shape and at the same time saying how much I have learned to respect Mr. Shapley as a representative of gas engineering. I lived with him for a number of years in Leeds and learned to know him, and to know how much he deserves the things that have been said of him to-day. I learned his characteristics of knowing what he wants, saying what he thinks, and generally getting what he wants, and I think that is a summary of qualities of which any man might be proud. But I particularly wish to say how much we in the University who are connected with the research which we so happily undertake with our colleagues in the Industry are indebted to Mr. Shapley for the great help he has given us and the readiness with which he has placed at our disposal the resources of his Department in carrying on our work. I have never ceased to say, as many of you know, almost to tiresomeness, how anxious we are always to bring into the closest possible association with our work those who are connected with the practical side of the Industry.

Your President is a member of a great family that I first knew when I came to this City in 1885, represented pre-eminently by one James Kitson, later Lord Airedale, a man whose memory will always be dear in this City, a great industrial man who would throw himself into every undertaking for the public good, and a man who, if I may speak personally, was one of my best friends and wisest advisers. You can imagine, therefore, what pleasure it gives me to come back to see another Kitson rising to that same position not only in the City but outside in the world and, above all, in the Industry with which we are all associated. I have watched Sir Francis Goodenough take up the work of this Association from the start. I have always treated it as my privilege to pose as a father, and to try to keep him in order; he has reciprocated like a son, affectionate if sometimes a little unruly. [Laughter.] We have lived together so far as I am concerned with great satisfaction, and I have watched with the greatest admiration the way in which he has conducted the affairs of this Association. I was pleased to see, and he was pleased to read in the "Yorkshire Post" this morning an allusion to the restraint with which he has carried forward the propaganda work for the Gas Industry. He reminded me to my satisfaction that I had said the same thing to him long before. I told him, I remember, a great many years ago, that he had discovered the secret of successful advertising, and that is in telling the truth—as nearly as possible. [Laughter.] Of course, there are advertisers who tell the truth, possibly some who tell the whole truth, but many who tell nothing like the truth. But Sir Francis Goodenough has come as near telling the truth as you can expect in human life. I will conclude by again saying how much I have enjoyed attending this conference, and I congratulate Mr. Shapley not only on his paper but on the great success which has attended the very great labours which this meeting must have entailed.

Prof. SMITHELLS writes: "I greatly regret that in the course of the few remarks I made at Leeds upon the history of the B.C.G.A. I omitted to take the opportunity of paying my tribute to the great work done by Mrs. Cloudesley Brereton and Mr. W. M. Mason. I can only beg excuse from the fact that I was speaking unpreparedly and after the assigned closing-time."

The PRESIDENT: I propose very briefly to second this vote of thanks to Mr. Shapley and, at the same time, to reply to the very nice things which Prof. Smithells had said about me. Mr. Shapley has done the work of organizing this conference in a way I knew he would do it; and if the results have been successful the thanks are due entirely to him. I am indebted to Prof. Smithells for the way in which he has referred to myself, but if I had realized he knew so much about my family

and my past I would not have allowed him to speak. [Laughter.] In all seriousness, however, in seconding this vote of thanks to Mr. Shapley for his paper I cannot help feeling that it was perhaps hardly fair to ask him to read a paper in addition to all the other work he had to carry out. I want also to thank Mr. Smith and Col. Carr for their papers. I was told that neither of them would read papers at this conference, but I set about them and they quickly said they would. [Loud laughter.] They have done so, and I am very delighted with all they have done in making this conference such a great success.

The vote of thanks to Mr. Shapley was carried with acclamation.

Mr. SHAPLEY: It is very kind of you to have said the things you have about me. The work that my staff and I have done has been a distinct pleasure, because you have all been so very friendly and made yourselves so much at home that it has been really a pleasure to do anything for your comfort.

Coke and Gas Featured at Bristol Exhibition

The eleventh of a series of successful Exhibitions was held in Bristol from Sept. 1 to 14. The Bristol Gas Company, as in past years, was one of the principal exhibitors. This year additional space was taken to demonstrate graded coke as a smokeless fuel for domestic purposes. The Company has recently installed coke grading plant and re-organized the Coke Sales Department, to assist in increasing local sales. As a means of introducing this fuel to the public, 7-lb. bags were offered free to persons visiting the exhibition. The coke stand, which was conveniently placed near the main exit, attracted much attention, and 2156 people carried away samples. In each case the name and address was obtained, and a "follow up" call is being made by the coke salesmen. In addition, 425 orders were received for free delivery of 28-lb. sample bags at 6d. each. The Company has already received numerous orders from satisfied users. The lighting, cooking, and heating section of the gas exhibit, one of the main features of the Exhibition, occupied an island site. The stand, the work of the Company's exhibition staff, was most artistically designed, and the appliances were displayed in an arresting manner. The hot water section, a separate unit, consisted of a comprehensive lay-out of the latest types of water heaters, shown under working conditions. The cookery lectures and demonstrations by Miss G. E. Richardson were as popular as ever, the average daily attendance being 250. Despite the summerlike weather, 43,000 people visited the exhibition, and the Gas Company report an increase in orders taken.

CONTINENTAL NOTES

USES OF GAS.

Three papers dealing with various successful applications of gas are contained in "Das Gas- und Wasserfach," 1932, 75 (Sept. 17).

W. Grigull (pp. 745-747) describes a gas-fired, thermostatically-controlled central heating installation in a school at Stettin. The volume of the rooms heated is 700,000 c.ft. Four vertical Askania boilers working under natural draught were installed. Details of the installation include a description of the means adopted for securing the correct draught and counteracting down draught. The rated capacity of each boiler is 540,000 B.Th.U./hour.

W. Jantzen (pp. 747-750) deals with the gas-fired kitchen of the Reichshof Hotel, Hamburg. Formerly a combination of gas [92,000 c.ft./month] and electricity [43,370 units per month] was employed; but now, with gas only, the gas consumption is 487,000 c.ft./month. Gas in conjunction with air under pressure is used for the ovens and grills, and the equipment includes, also, a gas-fired boiler.

The use of gas for the smoking of fish, sausages, &c., by a patented process, in Altona, is described by M. Windel (pp. 750-753). The smoking chamber is situated between a gas-heated calorifier which delivers hot air to it and a smoke generator of the type of a small mechanical producer in which wood chips are gasified. The goods are first dried by hot air and are then smoked. Details of the operations are given, and it is claimed that, in addition to its other advantages, the new process enables the smoking time to be halved.

We make mechanically operated Instruments, either to "Indicate" or "Record" the height of a Gasholder.

If such height is to be shown at a distance a Transmitter which indicates locally on a Dial, and which transmits impulses to a distant Instrument fixed in, say, an Office, is employed.

TANGENT
GENT & Co. LTD
Established 1872

Connections between the two being made by Overhead Line or a Cable can be buried in the ground.

Write for Catalogue Book 6, free on request.

Gents' Directors, Shareholders, and products are British.

FARADAY WORKS, LEICESTER

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The general tone of the Stock Markets last week was firm. Speculative issues lost favour, but there was a resumption of the demand for gilt-edged and other high-class investment securities, many of which showed appreciable improvement, the Assented War Stock at one time touching a new high point of 101 3/16. This reversal of interest has been largely brought about by the huge success of the Conversion Scheme, only 8 p.ct. of which will have to be redeemed on Dec. 1, and the present cheapness of money. The ban on new issues has now been partially lifted, but the restrictions which remain should be sufficient to guard against any reduction in the value of British Funds.

Gas stocks and shares showed little change compared with the previous week. The volume of business was about normal, and prices continued firm. There were only two changes of note—viz., an increase of 5 points to 115½ in Shrewsbury ordinary, and a fall of 10 points in Montevideo ordinary to 40.

There are doubtless many investors who have come into the Gas Market for the first time during the past few months, and these have every reason to be well satisfied with their holdings. Prices have been steadily rising, and the strength of the present position is illustrated in the following table showing the capital appreciation which has taken place in a number of ordinary stocks during the past six months:

—	Price—		Rise.
	April 2.	October 1.	
Barnet	120½	137	16½
Bournemouth 7 p.ct.	130	141	11
Brighton 6 p.ct.	117½	140	22½
Bristol	94	106½	12½
British	112½	133	20½
Cardiff	94½	104½	10
Commercial	96½	104½	8
Croydon sliding-scale	108½	135	26½
European	107	119½	12½
Gas Light units	20s. 6d.	23s.	2s. 6d.
Newcastle units	17s. 6d.	20s. 6d.	3s.
Portsmouth	124½	142	17½
South Metropolitan	103½	114½	11
South Suburban	104½	112½	8
Southampton	76½	95½	19
Tottenham	106	129½	23½
Uxbridge	102½	130½	28
Wandsworth	116½	135½	19

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Oct.* 3.

The prices of tar products for the current week are as follows:

Pitch is firm at 97s. 6d. to 100s. per ton f.o.b.

Creosote is 3½d. to 5d. per gallon f.o.b., according specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 7d.; pure benzole, about 1s. 11d.; 95/160 solvent naphtha, about 1s. 7½d.; and 90/140 pyridine bases, 3s. 9d. to 4s.—all per gallon naked at makers' works.

Tar and Tar Products in the Provinces.

Oct. 3.

The average prices of gas-works products during the week were: Gas-works tar, 33s. to 38s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 5½d. to 5¾d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 4½d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2¾d.; low gravity, 1¼d.; Scotland, 2¼d. to 2¾d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 1s. 6½d. to 1s. 7d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Oct.* 1.

Inquiries are more numerous, and a better feeling prevails; but meantime quotations show little or no alteration.

Crude gas-works tar.—Actual value is 47s. 6d. to 50s. per ton *ex* works.

Pitch remains unchanged with practically no supplies available for export. Value is nominal at 85s. to 90s. per ton f.o.b. Glasgow for export, and round 90s. to 100s. per ton *ex* works, according to grade, for home trade.

Refined tar to Ministry of Transport Specification is slightly easier at 3⅞d. to 4¼d. per gallon *ex* works in buyers' packages.

Creosote oil.—Demand is on moderate lines, but values are unchanged. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all *ex* works in bulk.

Cresylic acid has been receiving more attention, but orders remain scarce. Pale, 97/99 p.ct., is 1s. to 1s. 1d. per gallon; dark, 97/99 p.ct., 11d. to 1s. per gallon; and pale, 99/100 p.ct., 1s. 2d. to 1s. 3d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Value is steady at 4½d. to 5d. per gallon, according to quantity and quality.

Solvent naphtha is uninteresting at 1s. 2d. to 1s. 3d. per gallon for 90/160 grade, and 11d. to 1s. per gallon for 90/190 grade.

Motor benzole.—Makers are holding for 1s. 4d. to 1s. 5d. per gallon f.o.r. in bulk.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor "	1 6½	"	1 7	" " "
Pure "	1 10	"	1 11	" " "

Contracts Advertised To-Day.

Gasholder and Tank.

The Rothwell Urban District Council invite tenders for a gasholder and steel tank. [Advert. on p. 102.]

Alliance and Dublin Consumers' Gas Company.

At the half-yearly meeting of the Alliance and Dublin Consumers' Gas Company, held in Dublin, a dividend at the rate of £7 12s. 6d. p.ct. per annum, less tax, was passed on the consolidated ordinary stock. This is the maximum statutory dividend permissible.

The Chairman said the Company was faced for the first time with a liability to the corporation profits tax, which was estimated at approximately £13,000 per annum. Referring to the duty on British coal, he said they found that the difference in delivered cost between Continental gas coal and British coal would be a very substantial proportion of the 5s. per ton duty, and the yield in therms of gas was not nearly so good as from British coal.

They had now resumed taking their contract supplies of British coal with the approval of the Government, but subject to the emergency duty of 5s. per ton. He expressed the hope that there would be an early settlement of the contentious matters between the two countries.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 1. (Provincial Exchange Sept. 30.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅞	7⅞	Alliance & Dublin Ord. ...	100—110	...	109½
374,000	,,	July 4	4	4	Do. 4 p.c. Deb. ...	80—90	...	...
557,655	,,	Aug. 22	7	7	Barnet Ord. 7 p.c.	132—142	...	...
300,000	1	Apl. 29	1/4½	1/9½	Bombay, Ltd.	19/—21/-	...	...
177,750	Stk.	Aug. 22	9	9½	Bournemouth sliding scale	177—187	...	181
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	136—146	+1	143½
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	128—133	...	...
50,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	70—75	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	90—95	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
					Brighton, Hove, & Worthing			
357,900	,,	Aug. 22	7½	7½	6 p.c. Con. ...	135—145	...	...
540,000	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	120—130	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	125—135	+½	127
1,287,500	,,	Aug. 8	5	5	Bristol 5 p.c. max.	106—107[a]	...	...
120,420	,,	June 20	4	4	Do. 1st 4 p.c. Deb. ...	94—96[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	93—95[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	115—120[a]	...	...
855,000	,,	Apl. 4	7	8	British Ord.	128—138	...	131—132
100,000	,,	June 20	7	7	Do. 7 p.c. Pref.	130—130	...	...
350,000	,,	—	—	—	Do. 5½ p.c. Pref. ...	107—112	...	108½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	87—92	...	...
460,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	,,	July 4	5	5	Cambridge 5 p.c. Deb. ...	114—119	...	...
100,000	10	May 23	6	6	Cape Town, Ltd.	7½—8½	...	...
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	...
150,000	Stk.	June 20	4½	4½	Do. 4½ p.c. Deb. ...	87—92	...	...
636,860	,,	Aug. 8	6	6	Cardiff Con. Ord.	102—107	...	...
237,860	,,	July 4	2½	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Aug. 8	6½	5	Chester 5 p.c. Ord.	89—94[b]	...	...
98,986	1	May 25	2/-	2/-	Colombo, Ltd. Ord....	26/—31/-	...	...
34,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	18/—20/-	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,078,280	Stk.	Aug. 8	5½	5	Commercial Ord.	102—107	...	...
475,000	,,	June 20	3	3	Do. 3 p.c. Deb. ...	70—75	...	...
807,560	,,	Aug. 8	7	7	Croydon sliding scale ...	130—140	...	131—133
469,590	,,	,,	5	5	Do. max. div.	95—100	...	98—98½
500,000	,,	July 4	5	5	Do. 5 p.c. Deb.	115—120	...	118—119½
542,270	,,	Aug. 8	10	7	Derby Con.	120—130[c]	...	...
55,000	,,	July 4	4	4	Do. 4 p.c. Deb. ...	75—85[c]	...	...
209,000	,,	Sept. 5	5	5	East Hull Ord. 5 p.c. ...	93—98*	...	...
179,500	,,	Aug. 22	5¾	6	East Surrey Ord. 5 p.c.	108—118	...	...
155,019	,,	June 20	5	5	Do. 5 p.c. Deb. ...	114—119	...	...
1,002,180	,,	Sept. 19	16½	15	European, Ltd.	117—122*	...	118—120
19,405,992	,,	Aug. 8	5¾	5¾	Gas Light & Coke 4 p.c. Ord.	22/—24/-[f]	...	23/3—23/7½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	77—82	...	77—78
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	96—99	...	96½—98
6,102,497	,,	June 20	3	3	Do. 3 p.c. Con. Deb.	76—79	+1	77—79
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	111½—113
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	106—109	...	108—109
264,011	,,	Aug. 22	—	6	Harrogate New Cons. ...	104—109	...	...
82,500	,,	Aug. 22	7	7	Hastings & St. L. 5 p.c. Conv.	118—128	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	100—105	...	...
70,000	10	June 6	15	10	Hongkong & China, Ltd. ...	10—11	...	...
218,200	Stk.	Aug. 22	6	6	Hornsey Con. 5½ p.c. ...	103—108	...	...
5,600,000	,,	June 6	15	14	Imperial Continental Cap.	187—197	...	189½—193
228,180	,,	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb.	85—90	+3	...
235,242	,,	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	142—152	...	...
2,145,907	,,	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	109½—110½[b]	+1½	...
245,500	,,	June 20	5	5	Do. 5 p.c. Red. Pref. ...	100—110[b]	...	...
306,083	,,	July 15	4	4	Do. 4 p.c. Deb. ...	85½—90½[b]	...	...
165,786	,,	Sept. 5	10	8	Maidstone 5 p.c. Cap. ...	150—160*	...	...
56,176	,,	June 20	3	3	Do. 3 p.c. Deb. ...	65—70	...	...
75,000	5	June 20	110	110	Malta & Mediterranean ...	7½—8½	...	...
					Metropolitan (of Melbourne)			
892,000	—	Oct. 1	5½	5½	5½ p.c. Red. Deb.	95—100*	...	...
171,978	Stk.	Sept. 5	5	5	M. S. D. Utility "C." Cons.	92—97	...	93—94
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	80—85	...	...
112,126	,,	July 4	4	4	Do. 4 p.c. Deb. ...	87—92	...	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
675,000	,,	21 May '31	16	16	Montevideo, Ltd.	30—50	−10	34½—35
2,061,315	,,	Aug. 8	5½	5	Newcastle & Gateshead Con.	20/—21/-[d]	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	90—91[d]	...	...
691,705	,,	June 20	3½	3½	Do. 3½ p.c. Deb. ...	84—86[d]	...	...
277,285	,,	Apl. 29	5	5	Do. 5 p.c. Deb. '43...	105—107[d]	...	...
274,000	,,	Aug. 8	5	5	Newport (Mon.) 5 p.c. max.	86—88[a]	...	...
199,940	,,	Aug. 22	7½	7½	North Middlesex 6 p.c. Con.	135—145	...	...
396,160	,,	Aug. 8	5	5	Northampton 5 p.c. max. ...	88—93	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95	...	91
205,162	,,	June 20	8	8	Plym'th & Stonehouse 5 p.c.	140—150	...	142½—143
504,416	,,	Aug. 22	8	6	Portsm'th Con. Stk. 4 p.c. Std.	137—147	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	88—93	...	...
114,000	,,	Aug. 8	5	5	Preston 5 p.c. Pref.	100—105	...	...
686,312	,,	July 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	75—80	...	...
389,813	,,	June 20	4	4	Do. 4 p.c. Cons. Deb.	76—81	...	...
150,000	10	Sept. 19	6	6	San Paulo 6 p.c. Pref. ...	6½—7½*	...	...
1,786,968	Stk.	Sept. 5	6	6	Sheffield Cons.	108—112 *	...	...
95,000	,,	July 18	4	4	Do. 4 p.c. Deb.	92—96[e]	...	...
133,201	,,	Sept. 5	5	5½	Shrewsbury 5 p.c. Ord. ...	113—118	+5	117—117½
90,000	10	June 6	15	15	South African	4—6	...	...
6,709,895	Stk.	Aug. 8	7	8	South Met. Ord.	113—116	...	113½—115
1,186,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	130—135	...	131½—133
1,895,445	,,	July 4	3	3	Do. 3 p.c. Deb. ...	76—79	+1	76½—78
1,000,000	,,	July 18	4	5	Do. 5 p.c. Red. Deb.	108—113	...	113
91,500	,,	Aug. 8	8½	8½	South Shields Con.	130—131[d]	...	...
1,548,795	,,	Aug. 8	6	6	South Suburban Ord. 5 p.c.	110—115	...	112—113½
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	111
668,837	,,	June 20	5	5	Do. 5 p.c. Deb.	116—121	...	119½—120
647,740	,,	Aug. 22	5	5	Southampt'n Ord. 5 p.c. max.	93—98	...	...
121,275	,,	June 20	4	4	Do. 4 p.c. Deb.	92—97	...	...
200,000	,,	June 20	6½	6½	Swansea 6½ p.c. Red. Deb.	105—110	...	...
1,076,490	,,	Aug. 8	6¾	6¾	Tottenham and District Ord.	127—132	...	129
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	112—117	...	...
199,005	,,	June 20	4	4	Do. 4 p.c. Deb. ...	91—96	...	...
85,701	,,	Sept. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	67—72*	...	...
					Uxbridge, Maidenhead, &			
346,069	,,	Aug. 22	7	7	Wycombe 5 p.c.	128—133	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...	107
1,822,220	,,	July 4	7	7	Wandsworth Consolidated	133—138	+½	134½—136½
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	107—112	...	...
1,167,964	,,	June 20	5	5	Do. 5 p.c. Deb.	115—120	...	117—118½
158,400	,,	Aug. 22	6g	5	Winchester W. & G. 5p.c. Con.	98—103	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

THE CHAIRMAN,

SCHOOL FOR THE BLIND

(Founded 1838),

Swiss Cottage, LONDON, N.W.3

PERMANENTLY TIGHT

GAS VALVES

—LOW PRESSURE.—
3 in. to 72 in. Dia.

—HIGH PRESSURE.—
3 in. to 12 in. Dia.

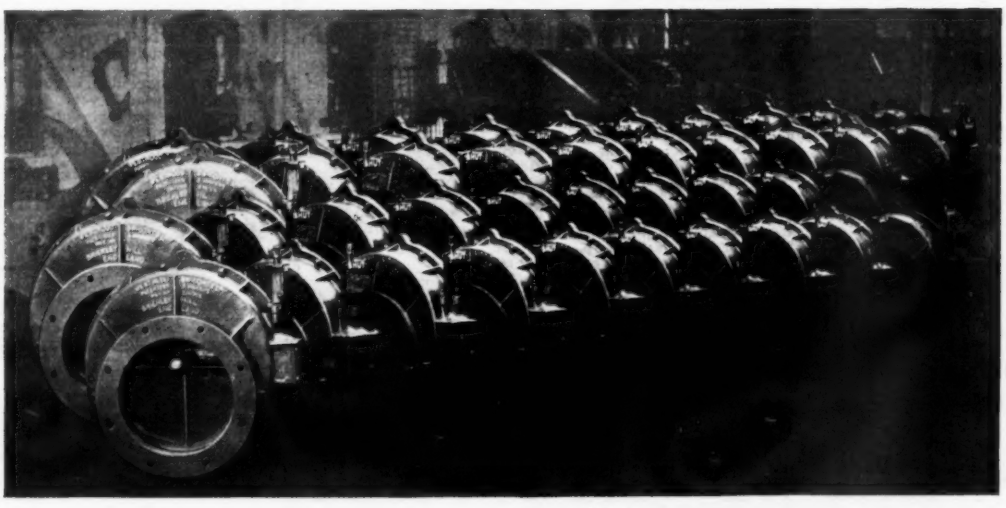
DESIGNED TO WITHSTAND ANY TEST UP TO 100 lbs. PER SQ. INCH AIR PRESSURE.

The true capabilities of a Gas Valve cannot be judged by its performance on the Test Bench, but by its ability to CLOSE TIGHTLY after long periods of REMAINING OPEN.

WESTWOOD & WRIGHTS' Patent Valves are designed to meet these requirements by the use of PERMANENTLY ENGAGED OIL FED FACES protected from contact with Gas.

YOU CAN ONLY AFFORD THE BEST

FOLLOW THE LEAD OF BRITAIN'S LARGEST GAS UNDERTAKINGS AND SPECIFY
WESTWOOD & WRIGHTS' PATENT GAS VALVES.



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